3.0 Open Space Management Issues

A primary goal of the OSMP was to identify the major management issues that the City and other preserve managers within the OSMP area will need to address as a part of open space, species, and habitat management and monitoring. Twenty-six often inter-related issues have been identified and are discussed below. Based on research, analysis, incorporation of requirements of the Carlsbad HMP and the MHCP, and consultation with City staff, preserve managers, resource agencies, and the Carlsbad Police department, background information has been provided on these issues along with conclusions and recommendations for how the City, the preserve steward, and preserve managers may be able to develop strategies to address these issues in individual preserve management plans and overall implementation of the OSMP. Table 3-1 lists these 26 issues and the conclusions/recommendations identified for each.

Table 3-1.
Summary of OSMP Issues and Conclusions/Recommendations

Issues		Conclusions/Recommendations
Issue 1: (Key Issue)	Wildlife Agency Management Responsibilities	The City has the ultimate responsibility for all monitoring, management, and reporting on all OSMP lands covered by the HMP/MHCP except those owned and /or managed by the wildlife agencies as of the date of the Carlsbad HMP implementing agreement.
Issue 2: (Key Issue)	Preserve Management on Existing Open Space on Private Lands	Existing open space on private lands including existing HOA open space will be maintained by the HOA or property owner according to existing HOA guidelines and/or other agreements with the City or wildlife agencies. The HOA or private landowner will be responsible for controlling trash, fire, and illegal encampments. The City is not financially responsible for active biological monitoring on these lands. If a regional funding source is available the City will coordinate with private landowners and HOAs to use these funds to implement and oversee active biological management on these lands at the required HMP/MHCP level.
Issue 3: (Key Issue)	Development of a Framework Monitoring and Management Plan	The Carlsbad OSMP will be the City's framework management plan. The resource agencies, interested organizations, and members of the public have been included in the process for the development of the OSMP (see Appendix B), therefore scheduling issues and resource agency/public involvement in the development of the draft framework plan have been addressed though this OSMP development process.
Issue 4: (Key Issue)	Preserve Management Plans and Area-Specific Management Directives	Carlsbad will work with existing preserve managers, future preserve managers, and City open space management staff to ensure that ASMDs are incorporated from the HMP/MHCP into the individual preserve management plans; and the new ASMDs are developed and incorporated as needed. The City will coordinate submittal of the ASMDs and preserve management plans to the wildlife agencies according to the timetables established in the MHCP. ASMDs and preserve management plans will be updated on a 3 to 5 year basis as needed. Preserve managers will submit annual reports to the City and the City will submit summary reports to the wildlife agencies every three years, as required by the MHCP.

TABLE 3-1. (CONTINUED)
SUMMARY OF OSMP ISSUES AND CONCLUSIONS/RECOMMENDATIONS

Issues		Conclusions/Recommendations
Issue 5: (Key Issue)	Funding to Close Management Gaps	The City will fund the additional monitoring and management activities needed to close the management gaps on lands it manages through annual budget appropriations or establishment of an endowment. However, as determined in the MHCP, the additional monitoring and management funding needed on the private/HOA open space must come from a regional funding source. Until a regional funding source is available the City will inspect the HOA lands that are a part of the preserve system at least once annually to verify that property-level management is occurring. If a regional funding source is available the City will coordinate with private landowners and HOAs to use these funds to implement and oversee active biological management on these lands at the required HMP/MHCP level. Management gaps on public/semi-public lands will be closed through coordination between the wildlife agencies, the other public/semi-public entities, and the City. The City will work with existing third party biological managers to maximize efficiency in the use of current endowments, and will work with them to identify funding for any remaining management gaps (including application of the regional funding source once it is available). The wildlife agencies will retain responsibility for funding all management and monitoring on open space they currently manage. No management gaps are expected on preserve areas established in the future for management by third party biological management entities.
Issue 6: (Key Issue)	Update of Fire Management Policies	The City will address basic issues of fire management through a comprehensive update of City fire management policies and guidelines based on the recommendations of the MHCP monitoring plan and the Wildland/Urban Interface Task Force or the equivalent current accepted regional fire management guidelines document. Resource-specific fire management planning will be incorporated into each individual preserve area plan to coordinate and manage the protection of sensitive resources during and after a burn event.
Issue 7:	Noise Impacts to Open Space	The City will work with preserve managers to develop public outreach and educational materials regarding the responsibility of "neighbors" adjacent to preserves to minimize their contribution to edge effects including noise impacts. The City and preserve managers with address specific noise impact problems with the adjacent residential, commercial, or industrial noise source on a case-by-case basis. Possible solutions for attenuation of roadway noise will be investigated by preserve managers and the City where high noise levels appear to be substantially reducing the viability of habitat.
Issue 8:	Lighting Impacts to Open Space	The City will work with preserve managers to develop public outreach and educational materials regarding the responsibility of "neighbors" adjacent to preserve to minimize their contribution to edge effects including lighting impacts. The City will continue to require shielding of major light sources on new development projects, with particular emphasis on light sources near preserve areas. The City and preserve managers will address specific lighting problems on a case-by-case basis.

TABLE 3-1. (CONTINUED)
SUMMARY OF OSMP ISSUES AND CONCLUSIONS/RECOMMENDATIONS

Issues		Conclusions/Recommendations
Issue 9: (Key Issue)	Landscaping and the Introduction of Nonnative Species	The City will establish policies and ordinances to increase the use of best management practices in landscaping (irrigation, fertilizers, pesticides/herbicides) in the vicinity the OSMP area, and to reduce the frequency of the selling and planting of species listed as noxious weeds as identified on the CalEPPC list (Appendix C). The City will work with preserve managers to identify problem species/areas, to form a coordinated response, and to develop public outreach and educational materials regarding the responsibility of land uses adjacent to preserve to minimize their contribution to edge effects including, landscaping/invasive plant impacts. Individual preserve owner/managers will work with all property owners adjacent to the preserve to educate them regarding irrigation runoff and fertilizer use. The City would only become involved in more serious cases where problems are persistent. Monitor trails for invasive species and remove invasive species populations. The City and preserve managers will address specific problems on a case-by-case basis.
Issue10: (Key Issue)	Invasive Ants	The City will establish policies and ordinances to increase the use of best management practices in landscaping with respect to invasive ant species in the vicinity the OSMP area (e.g. see landscaping guideline provided by the MHCP, specifically with respect to minimization of irrigation runoff). The City and preserve managers will ensure that all landscaping materials used within the preserve for restoration or landscaping of facilities do not contain Argentine ants, fire ants, and any other invasive pests.
Issue 11: (Key Issue)	Outdoor and Feral Animals	The City and preserve managers will develop a focused public outreach and education program that emphasizes the need for residents to control their pets to minimize their impact on the preserve system. Feral animals will be removed from preserve areas if possible. The City needs to work with existing preserve managers to address the issue of effective enforcement and deterrent methods. The City will increase the frequency of ranger patrols at preserves to increase public compliance with leash laws.
Issue 12: (Key Issue)	Alteration of Ecological Communities	The City and preserve managers need to include area-specific directives in their preserve management plans to periodically monitor the native species that often become abundant in edge-effected habitat. Control and removal programs will be initiated for any of these species that are shown to be causing the decline in other sensitive species conserved and managed under the HMP/MHCP. The monitoring and control of these species will be implemented within an adaptive management context.
Issue 13: (Key Issue)	Off-road Vehicles	To better address illegal off-road vehicle use, the City and preserve managers will work with the (Off-road Law Enforcement) ORLE team to develop a coordinated response plan. The coordinated response plan will consist of regular communication between preserve owner/managers and the ORLE Team to identify problem areas and plan enforcement efforts. Since illegal off-road activity tends to shift from location to location depending on enforcement, the coordination efforts will identify new "hot spots" with the goal of eliminating all such activities from the preserve system. In addition, all preserve entrances will include signage prohibiting off-road vehicle activity and providing a non-emergency phone number for members of the public to directly notify the Carlsbad Police and ORLE team when illegal activity is observed. Public outreach and education will be an important part of the effort to reduce illegal off-road vehicle use.

TABLE 3-1. (CONTINUED)
SUMMARY OF OSMP ISSUES AND CONCLUSIONS/RECOMMENDATIONS

Issues		Conclusions/Recommendations
Issue 14: (Key Issue)	Illegal Dumping	The City and preserve managers will ensure that potential dumpsites (relatively remote/hidden sites) in the OSMP area are inaccessible to vehicles through maintenance of gates and barriers. The City and preserve managers will establish an illegal dumping tipster hotline and post this phone number along with a non-emergency police number for real-time enforcement response. Substantial fines will be established, posted on signs, and enforced. The City and preserve managers foster a sense of community stewardship in the OSMP preserve system and "empower" the residents living near and using the open space to notify the City and law enforcement of any illegal activities including illegal dumping.
Issue 15: (Key Issue)	Management of Recreational Uses	The City and preserve managers will incorporate the MHCP guidelines for recreational uses into each preserve management plan. The MHCP guidelines will be used to establish a consistent set of rules for the OSMP citywide, to avoid confusion for members of the public. The City trails team and preserve managers will review the compatibility of the Carlsbad Citywide Trails Program and update or realign trails as needed in the plan to meet the biological protection goals and guidelines of the HMP/MHCP.
Issue 16: (Key Issue)	Enforcement	The City and preserve managers will pool their funding resources to hire five officer/rangers who will assist in preserve enforcement throughout the OSMP area. The City, preserve managers, and police department will establish a coordinated response plan to address these issues, and will work together and with local community groups on a public education program to explain goals and regulations as well as educate the public on the area's resources. The City needs to work with existing preserve managers to address the issue of effective enforcement and deterrent methods. The City will increase the frequency of ranger patrols at preserves to increase public compliance with leash laws, trespassing, and other illegal activities.
Issue 17: (Key Issue)	Itinerant Worker and Transient Camps.	The City will continue to work with local and regional agencies to find long-term solutions for housing of low-income itinerant workers and transients. The City will also work quickly to implement short-term solutions so that further habitat degradation is ceased. Note that a continued decline in habitat quality without active intervention from the City could result in the loss of one or more endangered species permits. The City will coordinate with all preserve managers to establish a protocol for reporting and handling illegal encampments to protect the health, safety, and legal rights of everyone involved. Preserve managers and rangers will notify the police department and the City when illegal encampments are discovered and will work with the City to remove structures and debris and revegetation the disturbed areas as necessary.

TABLE 3-1. (CONTINUED)
SUMMARY OF OSMP ISSUES AND CONCLUSIONS/RECOMMENDATIONS

Issues		Conclusions/Recommendations
Issue 18: (Key Issue)	Coordination of Monitoring and Management Responsibility	The process and structure for coordination and implementation of the OSMP is defined in detail in the introductory chapter of the OSMP. The City of Carlsbad will be responsible for coordinating with other cities in the MHCP to implement monitoring and management across the MHCP preserve network. The City will create the role of a Preserve Steward to oversee and support the science-based implementation of the OSMP. The preserve steward along with the USFWS and CDFG will provide oversight, including review of surveys, preserve management projects, and approval of results and reports generated by the monitoring program. The City of Carlsbad and its preserve steward and preserve managers are responsible for preserve level monitoring and management for the OSMP area, preparation of the preserve area plans specifying the monitoring and management activities for a given preserve area, and preparation of annual reports to the wildlife agencies summarizing monitoring and management actions and results.
Issue 19:	Trigger for Adaptive Management	The City of Carlsbad, the preserve steward and other preserve managers in the OSMP area will apply an adaptive management approach to all management activities. Corrective actions within an adaptive management context will be undertaken as soon as possible to prevent further degradation and more costly remedies later. If management targets (e.g., habitat condition, invasive species eradication, etc.) are rapidly deviating from desired goals, the preserve manager and/or City will contact the wildlife agencies and other issue experts to seek the best available advice as soon as possible.
Issue 20: (Key Issue)	Data Management	The City will require that preserve managers within the OSMP area adhere to all the MHCP established monitoring methods and use the standardized data collection formats. The City will investigate the development of a GIS database management tool that is accessible through the Internet and, if developed, will use this tool to efficiently maintain current data, coordinate management and monitoring, and provide information to the public.
Issue 21: (Key Issue)	Coordination of Lagoon Management	The City will work with the various lagoon management entities to coordinate dredging activities to meet the goals of hydrology/sediment management and biological conservation. The OSMP will be used as a tool to facilitate this coordination. CDFG will maintain the responsibility for species and habitat monitoring and management and the Southern California Caulerpa Action Team will continue to lead Caulerpa eradication efforts. The City will assist in monitoring and enforcement of the state ban on sale, transport, and possession of Caulerpa through periodic monitoring and informational outreach to pet stores and through educational outreach to the general public. The City will work with CDFG to improve enforcement of boating regulations on the lagoon areas where it is prohibited.
Issue 22:	Restoration	The City and preserve managers will need to incorporate restoration and enhancement into the individual preserve management plans. Additionally, detailed restoration management plans will need to be prepared for individual restoration projects for restoration required by project-specific mitigation, for the 104 acres of coastal sage scrub restoration through the OSMP area, and for additional restoration needs identified by preserve managers. Restoration management plans will be consistent with the guidelines provided in MHCP Volume III. The restoration of these 104 acres will occur once a regional funding source is available.

TABLE 3-1. (CONTINUED)
SUMMARY OF OSMP ISSUES AND CONCLUSIONS/RECOMMENDATIONS

Issues		Conclusions/Recommendations
Issue 23:	Erosion Control	The City and preserve managers will need to incorporate erosion control plans into the individual preserve management plans. The City will assist in coordination and repair of severe erosion problems. Erosion control and management plans will be consistent with the guidelines provided in MHCP Volume III.
Issue 24: (Key Issue)	Public Information, Education, and Beneficial Use of Open Space	The City will develop a citywide public information and education program to comprehensively address the public education and information needs as described above. Local public outreach to the immediate neighbors or other public users of the preserve will be conducted by each preserve manager as needed. The preserve manager will solicit assistance from the City-wide program as necessary and vise versa.
Issue 25:	Fencing and Signs	Signage and fencing are the responsibility of the primary management entity for each preserve area. The City will work with each preserve manager to develop standardized signage and OSMP rules and regulations to avoid confusion. Signage and fencing will be installed and/or maintained as described above and in the MHCP (Volume III).
Issue 26:	Preserve assembly and integration with Habitrak	The City will coordinate with preserve managers to establish a schedule and deadlines for reporting of data and project status with preserves so that citywide data are available to the City with sufficient time to update the Habitrak accounting system and prepare the City's annual reports.

3.1 Key Issues of Open Space Management in Carlsbad

There are several key issues for which the City and possibly the wildlife agencies and/or Coastal Commission will need to make policy and program decisions (e.g., how to deal with management gaps), or for which additional coordination and implementation mechanisms need to be developed (e.g., how to coordinate preserve enforcement with local law enforcement). This section highlights and outlines these key issues and makes recommendations for how best to proceed based on input received thus far in the OSMP development process. Key issues are called out where they occur. In addition, there are several other important management issues that, while not key issues requiring policy or program decisions were important to review since they are integral to open space management in the City of Carlsbad.

3.1.1 Management Responsibilities

As specified in the MHCP and HMP, the City is ultimately responsible (either directly or through agreements with other agencies or organizations) for the management and biological monitoring of its own public lands (including those with conservation easements); lands obtained as mitigation (where those lands have been dedicated to the City of Carlsbad or a third party biological management entity in fee title or easement); and lands within the City that may in the future be acquired through a regional funding program. Similarly, the CDFG will manage and monitor their present land holdings, consistent with the HMP and MHCP plans.

Issue 1 (Key Issue): Wildlife Agency Management Responsibilities

To ensure uniformity in data gathering and analysis, the wildlife agencies will assume primary responsibility for coordinating the MHCP biological monitoring program (e.g., identifying appropriate data collection methods, survey protocols, survey schedules, and standardized data collection forms), analyzing data at a subregional and regional level, and providing information and technical assistance to the City of

Carlsbad and other preserve managers within the City. However, the wildlife agencies will not have the primary responsibility to implement monitoring and management. This is the responsibility of the City along with individual preserve managers. Data analysis City-wide and at individual preserves is also the responsibility of the City and individual preserve managers.

The wildlife agencies have full financial and stewardship responsibilities for all lands they currently own and manage, and the City will not be financially responsible for ensuring that HMP/MHCP monitoring and management standards are met on currently owned wildlife agency lands (ecological reserves at Buena Vista, Agua Hedionda, and Batiquitos lagoons; a part of the former Carlsbad Highlands Conservation Bank; and 94 acres of the Holly Springs property. CDFG also manages Caltrans mitigation sites in Carlsbad). However, as per agreement among the MHCP cities, future wildlife agency acquisitions of Priority 1 properties (defined as areas that are highly constrained by narrow endemic species, major or critical locations of MHCP species, or wildlife corridors) within the City of Carlsbad will be the funding responsibility of the City (W. Tippets, CDFG, pers. com.).

> **Conclusion/Recommendation 1**: The City has the ultimate responsibility for all monitoring, management, and reporting on all OSMP lands covered by the HMP/MHCP except those owned and /or managed by the wildlife agencies as of the date of the Carlsbad HMP implementing agreement.

Issue 2 (Key Issue): Preserve Management on Existing Open Space on Private Lands

As described in the MHCP, open space areas associated with existing residential developments and governed by homeowners associations (HOA) will be maintained according to HOA guidelines. The HOAs will be responsible for controlling trash, fire, and illegal encampments. HOA open space areas may receive active biological monitoring and management pursuant to the MHCP if there is a regional funding source for biological management activities and if there are no legal (i.e., HOA) impediments. New HOA open space conserved after the City's subarea plan implementing agreement is adopted will be managed and monitored according to the specifications in the HMP/MHCP, if it is part of the preserve system.

If land is used as mitigation for public or private project impacts, or if private land is purchased with public funds or voluntarily dedicated in fee title, habitat management will be required consistent with the HMP/MHCP and associated habitat management plans.

Private landowners within the preserve who are not third-party beneficiaries of the City's take authorizations will have no additional obligations as a result of the MHCP for management or biological monitoring of their lands. Private landowners who are third-party beneficiaries will be responsible for habitat management of preserve lands they choose to retain in private ownership to the extent required by the Carlsbad HMP and implementing regulations and as specified as conditions of development permits.

> **Conclusion/Recommendation 2:** Existing open space on private lands including existing HOA open space will be maintained by the HOA or property owner according to existing HOA guidelines and/or other agreements with the City or wildlife agencies. The HOA or private landowner will be responsible for controlling trash, fire, and illegal encampments. The City is not financially responsible for active biological monitoring on these lands. If a regional funding source is available the City will coordinate with private landowners and HOAs to use these funds to implement and oversee active biological management on these lands at the required HMP/MHCP level.

3.1.2 Management Plans

Under the requirements of the MHCP, Carlsbad must prepare a framework monitoring and management plan as a condition of its implementing agreement with the resource agencies. The framework monitoring and management plan will provide general direction for all preserve management issues within the HMP boundaries and will reference the subregional MHCP Biological Monitoring and Management Plan.

Issue 3 (Key Issue): Development of a Framework Monitoring and Management Plan

The framework monitoring and management plan will identify and prioritize the specific species populations and vegetation communities to be managed, and will identify monitoring and management activities specific to individual regions, core areas, or linkages within Carlsbad that address specific covered species requirements and the City's preserve objectives. The framework management and monitoring plan will establish a process to develop area-specific management directives and describe how adaptive management will be undertaken based on new information on species and ecosystem needs. Existing preserve management plans will be incorporated by reference into the framework plan. Existing preserve management plans will be updated to address all the management and monitoring requirements of the HMP/MHCP as appropriate. This report is a part of the development of the Carlsbad OSMP, which will function as the City's Framework Management Plan.

Within 6 months of issuance of take authorizations the City is required to prepare a draft framework monitoring and management plan to submit to the wildlife agencies for review. The framework plan will be reviewed and approved by the wildlife agencies and finalized by the city within an additional 3 months. The development of the framework plan will also include a mechanism for public involvement.

> **Conclusion/Recommendation 3:** The Carlsbad OSMP will be the City's framework management plan. The resource agencies, interested organizations, and members of the public have been included in the process for the development of the OSMP (see Appendix B), therefore scheduling issues and resource agency/public involvement in the development of the draft framework plan have been addressed though this OSMP development process.

Issue 4 (Key Issue): Preserve Management Plans and Area-Specific Management Directives

Carlsbad also will need to develop area-specific management directives (ASMDs) to address monitoring and management issues at the site-specific level. There is no minimum acreage for which area-specific monitoring and management directives must be prepared and all subunits of the OSMP that have been included in the HMP/MHCP must have area-specific directives. This includes parcels outside of Carlsbad in the unincorporated area known as the gnatcatcher core area. The ASMDs will be incorporated into the individual preserve management plans that will be prepared (or updated) for each subunit (e.g., Bataquitos Lagoon Ecological Reserve, Rancho La Costa Preserve, etc.) managed by a given management entity (e.g., the City, CDFG, CNLM, etc.). It will be the responsibility of the individual preserve managers to incorporate ASMDs identified in the HMP/MHCP into their preserve management plans and to submit those plans to the City and wildlife agencies for approval. The City will be responsible for developing ASMDs and preserve management plans for all open space areas it directly manages. Currently, preserve management plans have been developed for three preserve areas, two are in the process of revision, and six others are in various stages of preparation (Table 3-2). Preserve managers will be required to manage their areas in compliance with their approved ASMD, subject to modification by the Preserve Steward to address emergency situations or adaptive management needs.

TABLE 3-2.
EXISTING PRESERVE MANAGEMENT PLANS FOR OPEN SPACE IN CARLSBAD

Preserve Management Plan	Date
CNLM: Habitat Management Plan for the La Costa Preserve	Aug. 2001
CNLM: Habitat Management Plan for the Kelley Ranch Habitat Conservation Area	Nov. 2002
CNLM: Habitat Management Plan for Choumas-Pappas and Alemir Properties	June 2005
Perpetual Land Management Plan for Calavera Nature Preserve	Currently being revised
Calavera Hills Phase II Final Habitat Management Plan	Currently being revised
CDFG: Batiquitos Lagoon Ecological Reserve Management Plan	In Draft[1]
CDFG: Buena Vista Lagoon Ecological Reserve Management Plan	In Preparation[1]
CDFG: Agua Hedionda Lagoon Ecological Reserve Management Plan	In Preparation[1]
CDFG: Carlsbad Highlands/Holly Springs Ecological Reserve	In Preparation
UC Reserve: Dawson/Los Monos Natural Reserve Management Plan	In Preparation[2]

[1] T. Dillingham, CDFG (pers. com.)
[2] I. Kay, UC Natural Reserve System (pers. com.)

For most preserve areas the ASMDs will be incorporated into an overall preserve management plan and as a separately bound document (See Appendix D for guidelines on preserve management plan format and content). However, for some smaller, isolated open space areas (e.g., an isolated parcel with a critical location of a narrow endemic plant), the ASMD(s) may be submitted to the wildlife agencies as a brief form that includes the ASMD(s), a map of resources on the preserve property, describes site-specific threats to resources, and identifies site-specific management and monitoring actions to address these threats (a sample ASMD form is included in Appendix B.8 of the MHCP Vol. III).

ASMDs will be developed and implemented to address species and habitat management needs in a phased manner for individual parcels or project areas, once conserved as part of the preserve, including any species-specific management required as conditions of the take authorizations. The project CEQA document, when necessary, will include these area-specific management directives. Preserve management plans and associated ASMDs must be developed (or updated) and approved by the wildlife agencies for preserve lands within the first year after lands are dedicated to the preserve and implemented immediately upon approval of the preserve management plan or ASMD form.

Both the OSMP framework plan (generally) and preserve management plans and associated ASMDs (specifically) will address the following management and monitoring actions, as appropriate:

- fire management
- public access control
- fencing and gates
- ranger patrol
- trail placement/creation evaluation
- trail maintenance
- visitor/interpretive services
- volunteer services
- hydrological management
- signs and lighting
- trash and litter removal
- access road maintenance
- access road maintenance
- domestic animal access control
- enforcement of property and/or
- homeowner requirements
- removal of invasive species
- nonnative predator control
- species monitoring
- habitat restoration
- management for diverse age classes
- use of herbicides and rodenticides
- biological surveys
- species management conditions

The preparation and implementation of the framework plan (OSMP), preserve management plans, and area-specific management directives will be coordinated among managers of the subunits within each management unit, across the City, and between subareas of the MHCP to ensure that the overall needs of species and habitats are met on a regional basis. Preserve managers will be required to review and update management plans on a three-year basis and associated ASMDs as necessary in the annual preserve work plans. Status reports shall be submitted annually to the City, and every 3 years to the wildlife agencies. The reports will summarize management activities, describe management priorities for the next 3-year period, discuss restoration activities, and evaluate funding and the ability to meet resource management goals.

> **Conclusion/Recommendation 4:** Carlsbad will work with existing preserve managers, future preserve managers, and City open space management staff to ensure that ASMDs are incorporated from the HMP/MHCP into the individual preserve management plans; and the new ASMDs are developed and incorporated as needed. The City will coordinate submittal of the ASMDs and preserve management plans to the wildlife agencies according to the timetables established in the MHCP. ASMDs and preserve management plans will be updated on a 3 to 5 year basis as needed. Preserve managers will submit annual reports to the City and the City will submit summary reports to the wildlife agencies every three years, as required by the MHCP.

3.1.3 Management Gaps

Management gaps are defined as the difference between the current on the ground management that is being implemented today and the management and monitoring that is required by the HMP/ MHCP and will be implemented in the future. Management gaps are defined in terms of differences between current and future required management and monitoring activities. Therefore, it is important to understand the current levels of management that occur on existing open space throughout the City and the level of management and monitoring that will be required in the future, under the HMP/MHCP. Section 2.4 (Levels of Open Space/Preserve Management and Monitoring) describes the management level terms used here (property management, preserve management, species monitoring and management, and regional monitoring).

There are approximately 7,135 acres of open space included in the OSMP area (Figure 3-1 and Table 2-2). Currently, the managers of the largest amounts of open space in the City are the wildlife agencies, third party biological management entities, and private landowners including HOAs, which manage 18%, 20%, and 24% of the open space, respectively. The City currently manages 8% of the open space and other public/semi-public entities (e.g., SDG&E) manage 6% of the area.

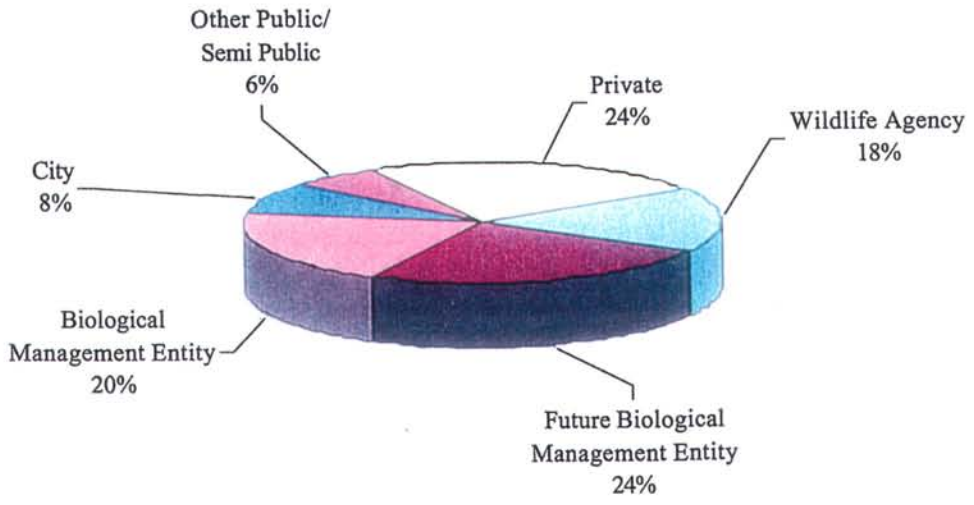

Figure 3-1. Distribution of open space management by general management entity.

Issue 5 (Key Issue): Funding to Close Management Gaps

The 604 acres owned and managed by the City and the 1,713 acres on private land make up 32% of the open space, and generally only receive property-level management. There are a multitude of private owners of open space including many HOAs. The City does not have a comprehensive list of the point of contact and specific parcels covered by most of the HOAs (D. Rideout, Carlsbad Principal Planner pers. comm.), therefore, no attempt was made at this time to contact the persons responsible for management on these properties. Instead, it is assumed that property-level management on these properties includes management of fencing, signage, fire buffers, trash, and trespassing on an as needed basis.

The City has management responsibilities on a number of open space areas throughout the City including several large open space parcels (Lake Calavera, Municipal Golf Course property, and Veterans Memorial Park). The City also holds a long-term lease on Hub Park (owned by SDG&E), and currently manages the property. Property-level management activities on these City-managed parcels focus on maintaining existing habitat values, and include trash removal, basic access controls, and fire prevention (D. Duncanson, Carlsbad Public Works Manager, pers. com.). The HMP/MHCP requires that management on the City managed and privately managed open space include the full complement of property, preserve, species management and monitoring, and regional monitoring activities. Therefore, there are significant management gaps on these areas.

There are 420 acres (6%) of open space under the ownership and management of other public or semi-public entities (e.g., SDG&E, Caltrans, North County Transit District [NCTD], State Parks). All but approximately 65 acres are the SDG&E and Cabrillo Power portions of Agua Hedionda Lagoon. Most of these parcels are managed at a property-level only. The SDG&E parcels are monitoring and managed according to the SDG&E NCCP, which focuses primarily on minimizing and remediating impacts from SDG&E operations and maintenance activities. It is assumed that CDFG will include all of Agua Hedionda Lagoon in the management plan CDFG is preparing. The Pointsettia vernal pools are conserved on property owned and managed by the NCTD, which has specific management and monitoring agreements with the wildlife agencies. NCTD will retain management responsibility for this preserve area. The City will work with the remaining public and semi-public entities to coordinate funding and management for their small parcels in the OSMP. Management gaps will occur on these public/semi-public areas once the HMP/MHCP is implemented. It is assumed the CDFG will work with SDG&E to identify funding for management of the lagoon areas. The City will work with the other entities to coordinate funding and management.

The wildlife agencies and the biological management entities manage a significant amount (38%) of open space in Carlsbad (1,254 and 1,413 acres respectively). Both management entities implement a significant amount of preserve-level management as well as species monitoring and management, depending on the resources present at a given property. There has not been a coordinated effort to implement regional monitoring in these areas prior to the development of the MHCP. There are many additional monitoring and management requirements in the HMP/MHCP that are not currently addressed at the required levels/intensities/frequencies by the third party managers or wildlife agency managers. Therefore, the combination of these additional management and monitoring requirements and the need for regional monitoring creates a management gap on these properties. The wildlife agencies have accepted responsibility for funding the management of their currently owned and managed lands at the new HMP/MHCP level. Management gaps on open space managed by third party biological managers will be the funding responsibility of the City through the regional funding source, once it is established.

Approximately 1,732 acres (24%) are currently in the standards areas of the OSMP and are assumed to be managed in the future by third party biological management entities. A portion of these areas will be developed and the remainder will be set aside as permanent natural open space. The development and permitting agreements with the wildlife agencies and the City will ensure that sufficient open space conservation and management endowments are established in conjunction with the development of these properties to cover all aspects of full HMP/MHCP required monitoring and management for all resources on these properties in perpetuity. Therefore, there are no management gaps expected on the area to be managed by future third party biological management entities. The City will require that these areas are managed by a professional biological management entity with the ability and experience to effectively management the preserve area and protect the species and habitat values in the preserves.

Note that a complete OSMP biological management and monitoring funding analysis has been prepared by CNLM and is contained in Appendix A of this document.

> **Conclusion/Recommendation 5:** The City will fund the additional monitoring and management activities needed to close the management gaps on lands it manages through annual budget appropriations or establishment of an endowment. However, as determined in the MHCP, the additional monitoring and management funding needed on the private/HOA open space must

come from a regional funding source. Until a regional funding source is available the City will inspect the HOA lands that are a part of the preserve system at least once annually to verify that property-level management is occurring. If a regional funding source is available the City will coordinate with private landowners and HOAs to use these funds to implement and oversee active biological management on these lands at the required HMP/MHCP level. Management gaps on public/semi-public lands will be closed through coordination between the wildlife agencies, the other public/semi-public entities, and the City. The City will work with existing third party biological managers to maximize efficiency in the use of current endowments, and will work with them to identify funding for any remaining management gaps (including application of the regional funding source once it is available). The wildlife agencies will retain responsibility for funding all management and monitoring on open space they currently manage. No management gaps are expected on preserve areas established in the future for management by third party biological management entities.

3.1.4 Fire Management Issues

Fire management is a critical component of management efforts in natural landscapes. The HMP/MHCP requires that the City create one or more fire management plans for its natural open space areas. This plan(s) will include measures to avoid destruction of sensitive plant species populations, to create fire management zones, and to educate fire control personnel on how to minimize impacts to sensitive species during fire suppression activities. Development of a fire management plan is a condition for conservation and management of a number of sensitive species covered by the HMP/MHCP.

Fire is an important ecological process in southern California landscapes and biological resource goals recognize that fire is a natural process in ecosystems. Many vegetation communities in the City depend on a regular cycle of burning for maintaining a balance of species, seed viability, and reproduction. As an ecological process, however, it has been drastically altered by the many effects of suburban development. Fire recurrence intervals have been shortened considerably due to accidental ignition and arson. Additionally, the close proximity of property and structures to open space and fires that occur there requires immediate suppression activities from the fire department. The natural fire cycle is affected by human activities, both by increasing fire frequency in some locations and decreasing it in others through fire prevention measures.

As a necessity, fire management must focus on two different objectives: achievement of biological resource goals, and hazard reduction for humans and their property. Fire management for human safety will continue in a manner that is compatible with conservation of biological resources. Fire management for human hazard reduction involves reducing fuel loads in areas where fire may threaten human safety or property, suppressing fires once they have started, and providing access for fire suppression equipment and personnel.

The MHCP identifies the following fire management practices as important considerations for the City's Fire Management Plan(s):

- Identify potential fuel reduction zones or firebreak locations as well as access routes for fire equipment in the event of wildland fires that pose safety concerns.

- To the degree feasible, site fuel reduction zones, firebreaks, and access routes to avoid sensitive biological resources, preferably at the top or bottom of a slope rather than across a slope. Use existing firebreaks (e.g., natural ridge lines, roads, fire roads) where available.

- In smaller fragmented preserve areas, manage fuel loads primarily for human safety, using mechanical fuel control measures such as chopping, disking and chaining, removal, and herbicides. Additional methods of value in smaller areas include mowing, trimming, and hand clearing. In general, chopping is the recommended methods based on biological and fuel reduction values and safety concerns. Investigate the use of managed goat herds for vegetation and fuel reduction (goat herds were not specifically mentioned in the MHCP, but have been used

for brush management elsewhere in California and locally, including along the urban/wildland interface in the City of San Diego between the community of Tierrasanta and the Mission Trails Regional Park.

- In larger preserve areas, such as in northeast and southeast Carlsbad, manage both for biological resource needs and for safety considerations. Where chaparral or coastal sage scrub stands are more than 20 years old, evaluate the need for prescribed burning, where practical, given safety and cost considerations. Fire management practices will be based primarily on the risks of uncontrolled wild fire in proximity to developed areas.

- Emphasize the use of "fire-safe" native plants in landscaping along preserve edges. Prohibit the use of invasive exotics, and adopt an exotic plant control plan.

Where preserve areas are planned adjacent to existing developed areas, the fuel management zone may, if unavoidable for safety reasons, encroach into the preserve. However, any such expansion of fuel management zones would require additional mitigation. Where new development is planned, brush management will be incorporated within the development boundaries and will not encroach into the preserve. The landowner and/or management entity is responsible for brush management in the City of Carlsbad. Landowners will consult with the City planning staff and fire department prior to clearing of any natural vegetation to ensure that 1) the clearing is necessary as a fire control safety issue; and 2) that the clearing does not encroach in a preserve area and/or is consistent with the City's wildlife and resource permits. All brush management activity adjacent to or in open space areas must be also be coordinated with the preserve manager for that area.

Issue 6 (Key Issue): Update of Fire Management Policies

The OSMP will address brush management and whether use of fire is necessary to manage the composition and age structure of vegetation communities. The small size of many OSMP preserve areas will make the use of fire difficult or impractical for biological management. The local fire department will be consulted so that both biological and safety goals are met. Brush management to reduce fuel and protect urban uses will occur where development is adjacent to the preserve. The City will develop a list of "fire-safe" plants and will encourage the use of "fire-safe" native plants in landscaping along preserve edges. Fire management will be consistent with the recommendations of the Wildland/Urban Interface Task Force (San Diego County Fire Chief's Association 1997) or the equivalent current accepted regional fire management guidelines document.

When fire management objectives are focused on attaining biological goals the fire management issues and actions will be incorporated into the preserve management plans developed by each preserve manager. A comprehensive update of City fire management policies will be undertaken by the City to integrate the recommendations of the Wildland/Urban Interface Task Force (or equivalent updated recommendations) with the City's own fire department policies and guidelines. Resource-specific fire management planning will be incorporated into each preserve area management plan that identifies the fire sensitive resources (habitat types and species locations) that must be addressed during and after a burn event. The City's update of fire management policies will be reviewed by the wildlife agencies.

> **Conclusion/Recommendation 6:** The City will address basic issues of fire management through a comprehensive update of City fire management policies and guidelines based on the recommendations of the MHCP monitoring plan and the Wildland/Urban Interface Task Force or the equivalent current accepted regional fire management guidelines document. Resource-specific fire management planning will be incorporated into each individual preserve area plan to coordinate and manage the protection of sensitive resources during and after a burn event.

3.1.5 Edge Effects and Encroachment

Effects on biological resources due to land uses at the edge of biological areas are commonly known as edge effects. Examples of things that cause edge effects associated with residential development include

noise and lighting impacts, increased erosion or sedimentation and siltation, increased human intrusion, exotic species invasion (plants and animals), and the disruption of the natural composition of native species (i.e., increasing human-adapted species at the expense of rarer and more sensitive species). The construction of access roads and utilities to serve residential development can also cause edge effects. Edge effects can affect vegetation communities, thus altering wildlife habitat and affect sensitive species.

Edge effects extend the human footprint beyond the area of development; however, they are more difficult to quantify because they often are not manifested in a change in the visual landscape, and often result in gradual change over a longer period of time. Furthermore, the types of edge effects are diverse and their effects are variable. For these reasons, individual preserve management plans must carefully evaluate the potential for edge effects and include activities to reduce or eliminate the impact of edge effects on species and habitats. Ongoing analysis of damaging edge effects and means to mitigate them will be carried out by the Preserve Steward on a Citywide basis.

The edge zone is the area in which land uses adjacent to open space areas have an impact on the biological value of the habitats. The edge zone varies greatly depending on the type of edge effect and the species or habitats potentially affected; therefore, it is not possible to identify a single edge zone distance for all species and habitats in all cases. As a general rule, however, the smaller an area of open space, the greater the proportion that will be affected by a given edge effect. Because some edge effects can extend for thousands of feet, there are no areas in the OSMP that are not affected by at least one type of edge effect. The types of edge effects that are the most prevalent in Carlsbad include noise, outdoor lighting, introduction of nonnative species (plants and animals, including pets), and disruption of the natural ecological community.

Because edge effects and encroachment are arguably one of the most important management issues for the Carlsbad OSMP, the various sources and mechanisms of these indirect impacts are discussed in detail below. To the extent possible, the area or distance from the adjacent land use that is impacted by the edge effect is quantified based on available data and information. An estimated range of distances is given for each impact type. When data were not available, a reasonable estimate of the distances was made. It is recognized that there is no substantial body of knowledge that currently exist addressing these concepts and issues.

Issue 7: Noise Impacts to Open Space

Residential areas are generally not substantial noise producers relative to commercial, and industrial land uses. However, noise associated with any human activity (e.g., residential, commercial, industrial land uses, and vehicular traffic) that permeates adjacent habitat may be a deterrent to some wildlife species and therefore, is an indirect impact. The study of animal response to noise is a function of many variables including characteristics of the noise and duration, life history characteristics of the species, habitat type, season and current activity of the animal, sex and age, previous exposure and whether other physical stressors (e.g., drought) are present (Manci et al. 1988).

Most studies of noise impacts to wildlife have addressed aircraft or traffic noise. More studies are needed to determine the long-term effects of noise disturbance. Long-term studies have been difficult because of the effort required and the complexity of the variables affecting animal survivorship (National Park Service 1994). While data are unavailable regarding the effects of residential noises on wildlife, one can assume that louder, prolonged noise is more detrimental than quieter, short-term noise. There are a number of potential rural residential noise sources. Some of the louder possible sources include off-road vehicles (motorcycle, 88 A-weighted decibels, [dBA] at 30 feet [Truax 1999]), yard equipment such as lawn mowers or leaf blowers (90 - 110 dBA at 3 feet [Rabinowitz 2000]), and chain saws (approx.117 dBA at 3 feet [Truax 1999]). Noise levels attenuate with distance, therefore, the effects of such loud noises would be greatest nearest the residence, but could be transmitted several hundred feet or more into the natural habitat.

A threshold of 60 dBA has been established as a guideline by the wildlife agencies for noise impacts to breeding sensitive bird species; however; there is no noise standard for other species. This standard is applied primarily for the California gnatcatcher, *Polioptila californica*, and the least Bell's vireo (*Vireo*

belli pusillus) and was based on studies on the least Bell's vireo, an endangered riparian bird (SANDAG 1990). Similar studies have identified adverse affects of noise on several other species of breeding birds (Reijnen et al. 1997; Riejnen and Foppen 1995). Noise attenuates at approximately 6 dBA per doubling of distance; therefore, the sample residential noise sources given above would attenuate to the 60 dBA standard for birds within a range of 96 feet (lawn mower) to 1,536 feet (chainsaw) from the source. These attenuation distances represent the upper limit to the impact distance and may be substantially reduced when the line-of-sight to the source is blocked by terrain or vegetation density is high.

Roadway noise is the most prevalent noise source impacting the habitat of the OSMP. Since many major roads and freeways cross or are adjacent to open space areas, roadway noise will continue to be an important and problematic issue. Roadway noise is best attenuated with the construction of noise barriers, however, noise barriers are very expensive and may preclude much of the wildlife movement and gene flow between open space areas. Therefore, construction of noise barriers is not a feasible noise control measure in most areas of the OSMP.

Most residential noise sources are likely to be intermittent and infrequent in comparison with the noise associated with roadway traffic. In the rare cases that residential noise is perceived as a persistent problem and impacts habitat values, the preserve manager will need to address the situation directly with the resident producing the noise and with the support of the police department as necessary. Education of residents adjacent to the preserve about edge effects in general through public outreach will be an important component to control residential noise sources.

> **Conclusion/Recommendation 7:** The City will work with preserve managers to develop public outreach and educational materials regarding the responsibility of "neighbors" adjacent to preserves to minimize their contribution to edge effects including noise impacts. The City and preserve managers with address specific noise impact problems with the adjacent residential, commercial, or industrial noise source on a case-by-case basis. Possible solutions for attenuation of roadway noise will be investigated by preserve managers and the City where high noise levels appear to be substantially reducing the viability of habitat.

Issue 8: Lighting Impacts to Open Space

Outdoor lighting associated with residential and commercial land uses in the Carlsbad OSMP area has the potential to illuminate adjacent sensitive habitat. Lighting is of concern due to the effect on nocturnal wildlife activities. For example, outdoor lighting can inhibit wildlife movement through wildlife corridors such as creek beds if the lighting illuminates any portion of the corridor. The amount of habitat affected by lighting varies greatly depending upon surrounding terrain and vegetation, on the brightness of the lights, the direction the lights are pointed, and whether the lights are left on all night or only for short periods (e.g., triggered security lights). Outdoor lighting has the greatest potential to affect nocturnal animals, primarily mammals that forage and move through habitat corridors at night.

To minimize the effects of lighting on sensitive species, lighting will not be permitted in the preserve except where essential for roadways, facility use, and safety. Along preserve edges, major highway lighting will be limited to low pressure sodium sources directed away from preserve areas. The MHCP provides the following lighting guidelines and recommendations:

- Eliminate lighting in or adjacent to the preserve except where essential for roadway, facility use, and safety and security purposes.

- Require lighting use restrictions consistent with existing city lighting guidelines within 200 feet of the preserve. Direct lighting in adjacent areas away from the preserve.

- Use low-pressure sodium illumination sources. Do not use low voltage outdoor or trail lighting, spotlights, or bug lights. Shield light sources adjacent to the preserve so that the lighting is focused downward.

- Avoid excessive lighting in developments adjacent to linkages through appropriate placement and shielding of light sources.

The preserve manager will need to address the individual lighting problems directly with the resident producing the light and with the support of the City and police department as necessary. Education of the residences adjacent to the preserve about edge effects in general through public outreach will be an important component to control residential light sources.

> **Conclusion/Recommendation 8:** The City will work with preserve managers to develop public outreach and educational materials regarding the responsibility of "neighbors" adjacent to preserve to minimize their contribution to edge effects including lighting impacts. The City will continue to require shielding of major light sources on new development projects, with particular emphasis on light sources near preserve areas. The City and preserve managers will address specific lighting problems on a case-by-case basis.

Issue 9 (Key Issue): Landscaping and the Introduction of Nonnative Species

Introduction of nonnative species is one of the most serious edge effects at the urban/wildlands interface (Alberts et al. 1993). Landscaping (i.e., the introduction of native or nonnative plant species around developed areas) may often be in direct conflict with biological objectives of open space management. Nonnative invasive plants invade native habitats by various means. Horticultural planting of nonnatives on land adjacent to native habitat facilitates invasion, and each residence or business adjacent to a preserve area can serve as a new epicenter for the dissemination of exotic plants into the adjacent natural vegetation (Harty 1986). While the presence of nonnative plant species adjacent to open space preserve provides the source for invasion, it is the physical disturbance of vegetation at habitat edges and the altered hydrological and moisture regimes that are the primary factors facilitating invasion of most nonnative plant species. Most nonnative invasive species are readily dispersed into these altered edge habitats as seeds or plant parts that are carried by wind, water, and humans.

The successful invasion of exotic species may alter habitats and lead to displacement or extinction of native species over time. For example, exotic invasions have been shown to alter hydrological and biochemical cycles and disrupt natural fire regimes (MacDonald et al. 1988; Usher 1988; Vitousek 1990; D'Antonio and Vitousek 1992; Alberts et al. 1993). Vitousek and Walker (1989) noted that aggressive nonnative species might displace native species by altering soil fertility. As native plants are displaced, animal species that rely on the plants for food and shelter may also disappear from the local ecological community. The degree to which nonnative plants are able to leave the landscaped areas and invade the natural landscape is generally a function of the amount of irrigation used, the invasive ability of the particular nonnative plant species used in the landscaping, and time. Nonnative plants can be dispersed substantial distances and may extend over one hundred feet into the habitat depending on irrigation practices (Alberts et al. 1993).

Invasive or potentially invasive weed species known or likely to occur in Carlsbad that may pose threats to native species include but are not limited to tamarisk (*Tamarix* spp.), Pampas grass (*Cortaderia selloana*), eucalyptus (*Eucalyptus* spp.), giant reed (*Arundo donax*), mustard (*Brassica* spp.), African fountain grass (*Pennisetum setaceum*), tocalote (*Centaurea melitensis*), purple false brome (*Brachypodium distachyon*), artichoke thistle (*Cynara cardunculus*), castor bean (*Ricinus communis*), fennel (*Foeniculum vulgare*), ice plant (*Mesembryanthemum chilensis*). These and other noxious weed species, as designated by the U.S. Department of Agriculture, are subject to federally funded prevention, eradication, or containment efforts (CalEPPC 1999). Legally, a noxious weed is any plant designated by federal, state, or local governments as injurious to public health, agriculture, recreation, wildlife, or property (BLM 1999, Sheley et al. 1999 in BLM 1999). The MHCP provides the following recommendations for control of invasive exotic plants:

- Prioritize areas for exotic species control based on aggressiveness of invasive species and degree of threat to the native vegetation (see CalEPPC list, Appendix C).
- Eradicate species based on biological desirability and feasibility.
- Use an integrated pest management approach, i.e., use the least biologically intrusive control methods, at the most appropriate period of the growth cycle, to achieve the desired goals.

- Consider both mechanical and chemical methods of control. Only herbicides compatible with biological goals will be used. Only licensed pest control advisers are permitted to make specific pest control recommendations.

- Properly dispose of all exotic plant materials that are removed from preserve lands (e.g., in offsite facilities).

- Revegetate exotic weed removal areas with species appropriate to biological goals.

The City will establish policies and ordinances that support the control of species invasions in the vicinity of the OSMP area. Policies and ordinances could include:

- Prohibiting the sale of noxious weed species (see CalEPPC list, Appendix C) at nurseries in the City.

- Establishing and enforcing penalties for landowners whose landscaping activities encroach on the OSMP areas (clearing, planting, species invasion, irrigation, or pesticide/herbicide use).

- Implementing a public outreach campaign to educate residents and businesses on the importance of using "best management practices" for landscaping near OSMP areas.

Preserve management plans developed for each preserve area will identify problem species/areas. Preserve managers will develop a timeline for scheduled exotic plant species removal and subsequent revegetation that minimizes the risk of run-off and erosion problems (i.e., avoid major removal projects during the rainy season and initiate revegetation quickly).

For maximum efficiency and effectiveness, the City and preserve managers will coordinate efforts among themselves and with state and regional efforts to eliminate the most problematic invasive species. For example, the City and preserve managers could coordinate with activities of the southern California "Team Arundo" on Arundo eradication. Team Arundo formed in Orange County in 1991 to control Arundo Donax along the Santa Ana River, and has since become a statewide program. Chapters exist in the Bay Area, San Luis Obispo and surrounding counties, Greater Los Angeles County, in addition to the Santa Ana River chapter, Team Arundo El Sereno, which covers San Diego County and the Santa Ana River (led by Judy Mitchell in Fallbrook). Arundo control in the City would be most effective if coordinated with the ongoing activities and experience of Team Arundo.

The City will work with preserve managers and City staff to ensure that ornamental/nonnative landscaping is absent or minimal in all areas of the OSMP designated as natural open space under the HMP/MHCP. However, where landscaping may be required (e.g., around parking areas or nature centers), or where problems are anticipated in preserve areas due to landscaping in nearby developed areas, the following guidelines have been provided in the MHCP and will be followed:

- Prohibit the use of nonnative, invasive plant species in landscaping palettes in the OSMP area or for new public projects within 200 feet of natural open space. This includes container stock and hydroseeded material.

- Revegetate areas of exotic species removal with species appropriate to the biological goals of the specific preserve area.

- Avoid genetic contamination of native plant species by prohibiting the introduction of cultivars or native species from different geographic regions. If these introductions are similar enough genetically to native species in the OSMP area, then cross-breeding or hybridization could occur. Native species proposed for landscaping or restoration onsite will be propagated from material collected in the vicinity. Special attention will be given to the elimination of native plant

landscaping cultivars of coastal sage scrub and chaparral species taken from central or northern California locations, or from islands off the coast of southern California.

Irrigation runoff alters conditions in natural areas that are adapted to xeric (dry) conditions, thereby promoting establishment of nonnative plants and displacement of native species. In addition, irrigation runoff can carry pesticides into natural areas, adversely affecting both plants and wildlife. The City and preserve managers must work with adjacent properties to control irrigation of landscaping material within 200 feet of the preserve boundary to prevent runoff into the preserve.

Fertilizers carrying excess nitrogen are often carried by irrigation and runoff into natural open space areas. Excess nitrogen is detrimental to plant mycorrhizal growth (essential for root development and nutrient uptake in many native plant species) and fosters exotic weed invasion. The City and preserve managers will need to monitor and limit, to the degree feasible, fertilization of ornamental plants on all areas draining into the preserve, to reduce excess nitrogen runoff to areas of native vegetation. Education of the residences adjacent to the preserve about edge effects in general through public outreach will be an important component to controlling all of these landscape-related edge effects. Preserve managers will need to address the specific landscaping and invasive plant species problems directly with the property owner where the problems are occurring.

Preserve managers will be responsible for monitoring the potential for spread of invasive species along trails. Where invasive species are spreading along official trails in the preserve system these areas will be targeted for eradication of the invasive species.

Conclusion/Recommendation 9: The City will establish policies and ordinances to increase the use of best management practices in landscaping (irrigation, fertilizers, pesticides/herbicides) in the vicinity the OSMP area, and to reduce the frequency of the selling and planting of species listed as noxious weeds as identified on the CalEPPC list (Appendix C). The City will work with preserve managers to identify problem species/areas, to form a coordinated response, and to develop public outreach and educational materials regarding the responsibility of land uses adjacent to preserve to minimize their contribution to edge effects including, landscaping/invasive plant impacts. Individual preserve owner/managers will work with all property owners adjacent to the preserve to educate them regarding irrigation runoff and fertilizer use. The City would only become involved in more serious cases where problems are persistent. Monitor trails for invasive species and remove invasive species populations. The City and preserve managers will address specific problems on a case-by-case basis.

3.1.6 Animal Species Interactions

The introduction of exotic species or nonnative predators often puts native species at a disadvantage, so special management measures are needed to control exotic species and nonnative predators. Nonnative plant and animal species have few natural predators or other ecological controls on their population sizes, and they thrive under conditions created by humans. These species may aggressively out-compete native species or otherwise harm sensitive species. When top predators are absent, intermediate predators multiply and increase predation on native bird species and their nests. Feral and domestic animals, particularly cats, also prey on small native wildlife species. Agricultural areas, livestock holding areas, and golf courses provide resources for increased populations of parasitic cowbirds, which adversely affect native songbird populations. Litter and food waste from migrant worker camps and picnickers can contribute to an increase in Argentinean ant populations, which out-compete native ants, the primary food resource of San Diego horned lizards. The next several issues discussed below are also types of edge effects; however these effects occur as a result of a change in the ecological dynamics of species interactions (introduction of nonnative species or alteration of species densities), rather than a direct physical change to the habitat (e.g., noise, light, irrigation).

Issue 10 (Key Issue): Invasive Ants

The Argentine ant (*Linepithema humile*) has become virtually ubiquitous with suburban development in southern California. It is spread to new areas through the movement of soil and plant materials, often associated with landscaping activity. The Argentine ant disrupts the ecosystem in natural open space areas because it competitively displaces other native ant species resulting in substantial decline or local extinction of those ant species (Suarez et al. 1998). Native ant species have many ecological roles in the habitats of San Diego County including as seed dispersers, as agents in soil development and turnover, and as a food source for several species including the San Diego horned lizard (*Phrynosoma coronatum blainvillii*), a rare and declining species in the City of Carlsbad.

When Argentine ants are introduced to an area, they can quickly spread into the natural habitat. Increased soil moisture created by irrigation of landscaping may facilitate the invasion of the Argentine ant (Suarez et al. 1998). Linear disturbances such as roads, trails, and fence lines may also facilitate their spread (De Kock and Giliomee 1989). Although Argentine ants competitively replace the native ants, they do not replace their role in the ecosystem. Therefore, the functions of seed dispersal, soil development, and food source for other species is lost. Without these ecological services provided by ants, plant communities and the associated habitat structure may eventually change potentially resulting in the disappearance of some animal species. Argentine ants can invade up to 1 km into natural habitat (e.g., Torrey Pines State Park [Suarez et al. 1998]). However, the strongest impacts from Argentine ants are likely to occur adjacent to (<200 m) commercial/residential areas.

Red fire ants (*Solenopsis invicta*) have recently been documented in San Diego County (at a property being landscaped in San Marcos). Although they have not yet become a problem in San Diego County, there is reason to be concerned and proactive to prevent red fire ant invasions. Certain types of wildlife, such as deer, ground-nesting birds, and reptiles, are especially affected by ants during and soon after birth or hatching. While the impact of fire ants on populations of wildlife are largely undocumented, they are a likely cause of the decline of many groups of species where they have become established.

The only effective management action currently known for Argentine ants and fire ants is preventing invasion of the preserve by controlling water runoff into the preserve and inspecting landscaping for ants prior to installation. Localized treatment with pesticides may be effective in isolated cases. However, pesticides must be used cautiously and as a last resort because they will also kill native ant species that may not recolonize the treated area as quickly as the nonnative ants, thus defeating the purpose of treatment.

The City will develop a policy and guidelines for landscaping contractors working in the City to control the spread of exotic ants pests by inspecting all planting stock before it is delivered to any property in or adjacent to open space areas. Both the Argentine ant and red fire ant are known to be transported in container planting stock. Any container stock to be imported into the OSMP area or property adjacent to a preserve area must be first inspected by qualified experts to detect Argentine ants, fire ants, and any other invasive pests. The City will strongly discourage (through public outreach and education of landscape contractors and nurseries) the use of infected stock within 300 feet of the preserve. Infected stock will be property treated or disposed of by qualified experts based on Best Management Practices.

> **Conclusion/Recommendation 10:** The City will establish policies and ordinances to increase the use of best management practices in landscaping with respect to invasive ant species in the vicinity the OSMP area (e.g. see landscaping guideline provided by the MHCP, specifically with respect to minimization of irrigation runoff). The City and preserve managers will ensure that all landscaping materials used within the preserve for restoration or landscaping of facilities do not contain Argentine ants, fire ants, and any other invasive pests.

Issue 11 (Key Issue): Outdoor and Feral Animals

Predation on sensitive animal species by domestic pets (especially house cats) is an edge effect particularly associated with residential land uses. Predation by domestic cats may be limited by the presence of larger

predators such as coyotes and foxes because cats are likely to venture much shorter distances from the residences into open space areas, particularly at night when cats do the majority of their hunting (Spencer & Goldsmith 1994). Dogs allowed to run off the leash can disturb breeding birds, and may kill small mammals and reptiles (Kelly and Rotenberry 1993; Spencer and Goldsmith 1994). Unleashed, unattended dogs have been observed within reserves at a distance of greater than 325 ft from the edge, while cats have been observed within reserves more than 1 mile from human dwellings in Riverside County (Kelly and Rotenberry 1993).

The City and preserve managers can minimize the impacts on sensitive animal species by domestic pets primarily through public outreach and education to convince residents adjacent to preserves to keep pets indoors at all times (especially cats), limit hiding/stalking areas for cats near bird habitats such as feeders or other gathering places, spay and neuter pets to minimize the breeding of unwanted pets, and refrain from feeding stray cats or releasing unwanted cats into the wild. Some of these activities, such as spaying and neutering, are currently encouraged countywide and subsidized by the San Diego County Humane Society.

Leash laws will be designated and enforced in all natural open space areas. Currently, preserve managers have no ability to enforce leash laws other than through verbal reprimands and voluntary cooperation (T. Dillingham, CDFG pers. com.; M. Spiegelberg pers. com.). The City staff, police and preserve managers will investigate ways to improve enforcement of leash law in OSMP areas.

Preserve managers will document evidence of feral or domestic animal use in the preserve and fence areas between selected areas of the preserve and adjacent housing to keep pets out of particularly sensitive areas. Preserve managers will coordinate with the City and the County humane society to establish a feral animal removal program to be applied in areas where feral domestic animals are documented as a persistent problem.

> **Conclusion/Recommendation 11:** The City and preserve managers will develop a focused public outreach and education program that emphasizes the need for residents to control their pets to minimize their impact on the preserve system. Feral animals will be removed from preserve areas if possible. The City needs to work with existing preserve managers to address the issue of effective enforcement and deterrent methods. The City will increase the frequency of ranger patrols at preserves to increase public compliance with leash laws.

Issue 12 (Key Issue): Alteration of Ecological Communities

In southern California, several native mammal species that are well adapted to areas around residential development are also major nest predators, including skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), and opossum (*Didelphis virginiana*) (Soulé et al. 1988). Other human-adapted bird species such as scrub jays (*Aphelocoma californica*), ravens (*Corvus corax*), and crows (*Corvus brachyrhynchos*) are also frequent nest predators. Even though these are native species, they become the agents for human-caused ecological disturbances because the presence of human activities may artificially increase their populations resulting in population decreases in other species. For example, as these species increase their population densities near residential development, the greater bird community suffers increased nest predation and subsequent population declines. Research has shown significantly higher density of many of these species in habitat nearer residential development (Odell and Knight 2001).

A second phenomenon known as mesopredator release (Soulé et al. 1988) occurs when patches of habitat become too small, fragmented and isolated to support larger carnivores such as coyotes (*Canis latrans*). Without the coyote, populations of the smaller nest predators increase significantly with a corresponding decrease in the abundance and breeding success of smaller vertebrates (birds, mammals, and reptiles). Crooks and Soulé (1999) documented this effect in coastal canyons of San Diego County where they found significantly higher predation rates by house cats in areas where coyotes were absent.

The MHCP includes the following recommendations to monitor and control native predators:

- Monitor population levels of selected native predators (bobcat, coyote).

- Institute an educational program to explain the role and necessity of large native predators within the ecosystem and the need to protect them from disturbance.

- If key native predator species (coyote, bobcat) are extirpated from the preserve, initiate a program to control mesopredators (gray fox, skunks, raccoon, and opossum).

The brown-headed cowbird (*Molothrus ater*) is also well adapted to human-altered environments including areas around residences. The brown-headed cowbird is another problematic species for native songbirds because it is a nest parasite that lays its eggs in the nests of host species. The cowbird chick displaces the young of the host species such that, in areas where cowbird parasitism is widespread, the populations of the host species can be significantly reduced. Cowbird parasitism has been a major problem for sensitive bird species in southern California (Kus 2000), including the endangered least Bell's vireo and southwestern willow flycatcher (*Empidonax traillii extimus*). MHCP requires that cowbird trapping be initiated if parasitism rates exceed 10% of monitored nests of native species. Preserve managers will include methods to monitor and document the extent of cowbird parasitism on target species nests in the preserve as an area-specific directive in preserve management plans.

> **Conclusion/Recommendation 12:** The City and preserve managers need to include area-specific directives in their preserve management plans to periodically monitor the native species that often become abundant in edge-effected habitat. Control and removal programs will be initiated for any of these species that are shown to be causing the decline in other sensitive species conserved and managed under the HMP/MHCP. The monitoring and control of these species will be implemented within an adaptive management context.

3.1.7 Public Access and Recreation

Public access is appropriate in the OSMP area for passive recreational uses and to promote understanding and appreciation of the natural resources. Excessive or uncontrolled access, however, can result in habitat degradation through trampling and erosion (e.g., along trails) and disruption of breeding and other critical wildlife functions at certain times of the year.

Passive recreational activities (e.g., hiking, bird watching) are anticipated within the preserve and are generally compatible with HMP/MHCP conservation goals. In general, passive activities pose a significant threat to biological resources when the level of recreational use becomes too intense or in areas of sensitive resources. Active recreational activities such as picnicking, equestrian use, and mountain biking may also occur in or adjacent to the preserve, if restricted to selected areas. These activities are conditionally compatible with biological objectives of the MHCP.

The MHCP recommends that construction of new facilities to support recreational uses (including access roads, parking lots, service facilities, maintenance buildings, and landscaping) will be prohibited in the natural habitat within the HMP/MHCP. Construction of these facilities can cause further habitat fragmentation and can result in increased traffic, auto emissions, and petrochemical runoff; pesticide and fertilizer runoff; use of invasive nonnative plants in landscaping; use of outdoor lighting; and changes in local drainage patterns. These activities may have adverse impacts to air and water quality as well as wildlife use of the area and will not be sited within the preserve boundaries.

There may be some instances where construction of a well-planned facility (e.g., a trailhead, small parking area, education/information kiosk, and trash dumpsters) may eliminate other more destructive patterns of use (e.g., parking in habitat, creation of multiple trails, and littering) and will help educate the public on appropriate uses and good stewardship practices.

Issue 13 (Key Issue): Off-road Vehicles

Illegal off-road vehicle use has been a persistent and highly destructive activity in many of the larger open space areas of the City. Off-road vehicles are prohibited anywhere within city limits; however,

enforcement of existing laws has been difficult. Adverse impacts of off-road vehicle use include reductions in air quality due to automotive exhaust and creation of dust, soil erosion and sedimentation into local waters, noise, and habitat degradation. Disturbance from off-road vehicles can also disrupt breeding activities. For these reasons, off-road vehicle use is not compatible in the preserve. In addition to the severe impacts on native habitats, soil stability, and water quality, illegal off-road vehicle use is a safety hazard to other members of the public.

Illegal off-road vehicle use has occurred within the City's undeveloped areas for a long time; however, as areas become designated as preserve areas it has become increasingly important to regulate vehicle access and enforce existing laws. A number of newspaper articles in the North County Times have highlighted the problems associated with controlling off-road vehicle use in Carlsbad (e.g., NC Times 11/29/01, 8/4/02). As an example, the open space around Mount Calavera has had a number of problems with illegal vehicle activity in recent years. The Calavera Nature Preserve, managed by The Environmental Trust, has had repeated off-road vehicle damage to sensitive habitat restoration areas. The Carlsbad Highlands Ecological Reserve, managed by CDFG, has had perpetual problems with illegal vehicle use. CDFG cites limited manpower for enforcement and funding for signage, gate, and barrier repair/installation as the primary reasons the problems persist.

To address these problems, the City has established an Off-road Law Enforcement (ORLE) team to better monitor and respond to illegal activities in open space areas. ORLE team members, who ride off-road motorcycles, respond to complaints of illegal off-road activity and contact/cite the offenders. In addition to enforcement, ORLE officers frequently locate stolen and abandoned vehicles, trash dumpers, and coordinate with the fire department in the event of wild fires.

The City will investigate ways to design legal public use access from new developments that will prohibit illegal off-road vehicle access into the preserve system.

> **Conclusion/Recommendation 13:** To better address illegal off-road vehicle use, the City and preserve managers will work with the (Off-road Law Enforcement) ORLE team to develop a coordinated response plan. The coordinated response plan will consist of regular communication between preserve owner/managers and the ORLE Team to identify problem areas and plan enforcement efforts. Since illegal off-road activity tends to shift from location to location depending on enforcement, the coordination efforts will identify new "hot spots" with the goal of eliminating all such activities from the preserve system. In addition, all preserve entrances will include signage prohibiting off-road vehicle activity and providing a non-emergency phone number for members of the public to directly notify the Carlsbad Police and ORLE team when illegal activity is observed. Public outreach and education will be an important part of the effort to reduce illegal off-road vehicle use.

Issue 14 (Key Issue): Illegal Dumping

Littering and illegal dumping are acts of improper disposal of trash. However, there are subtle differences. Litter is primarily small items that are scattered about, including items such as paper, food containers, beverage containers, convenience products, newspapers, vehicle debris and cardboard. Littering can be an intentional act or it can be accidental. While litter is often easy to remove, keeping an area litter free can be costly and time consuming.

Illegal dumping is always an intentional act and is done for many reasons – cost, convenience, ignorance, habit, profit, or to hide other illegal activities. Illegal dumping often involves large items or large quantities of small items, including appliances, tires, bags of daily trash, furniture, and other household wastes. Illegal dumpsites are often difficult and costly to clean up, and they take a greater toll on the environment and surrounding communities.

Illegal dumping in Carlsbad includes old appliances, abandoned vehicles, yard waste, construction waste, and miscellaneous household waste. The Off Road Vehicle Law Enforcement (ORLE)

team of the Carlsbad police department have the primary responsibility for identifying and reporting incidents (Sgt. J. Chapman, pers. comm.) along with other concerned members of the public. As the City has continued to develop and build out the extent of illegal dumping has decreased (due to the reduction in clandestine open space areas for dumping); however, a noticeable increase occurred with the closing of the San Marcos landfill in 1997, which left no convenient legal dumping location. Incidents of illegal dumping dropped again once the City opened a waste transfer station open to the public (Sgt. J. Chapman, pers. com.).

Illegal dumping in the Carlsbad OSMP area can have a number of negative effects:

- Pollute ground and surface water. Rain or runoff washes over trash and percolates into groundwater, and trash is often tossed directly into streams.
- Directly impact habitat.
- Injure wildlife directly through entanglement, etc. or indirectly through ingestion of toxic waste material or contaminated water.
- Introduce other human health and safety hazards.
- Decrease the value of the property that contains the trash and adjacent properties.
- Attract other crime. "If it's safe to dump here, it's safe to do other illegal activities here."
- Discourage new residents and businesses.
- Take away tax dollars that could be better spent to serve the community.
- Decrease community worth, which further impacts other social aspects of an area.
- Spoil the beauty of the land.

Illegal dumping typically occurs in areas where the perpetrators think they are hidden from detection; therefore, prohibiting vehicle access to more remote areas of open space will limit the number of incidents. Signage with clearly posted fines for illegal dumping and a tipster hotline number will also act as a deterrent in other more accessible areas. Creation of a sense of personal responsibility and stewardship in the local residents adjacent to preserve areas through the education and outreach component of the HMP/MHCP and OSMP implementation can create a 'neighborhood watch' mentality that will increase the frequency of reporting tips along with the deterrent effects on likely polluters. As an example, The Escondido Creek Conservancy (TECC) has a Trash Hotline to report incidents of illegal dumping. Then the TECC schedules regular "Clean Up" days where local residents volunteer to help remove trash and debris.

> **Conclusion/Recommendation 14:** The City and preserve managers will ensure that potential dumpsites (relatively remote/hidden sites) in the OSMP area are inaccessible to vehicles through maintenance of gates and barriers. The City and preserve managers will establish an illegal dumping tipster hotline and post this phone number along with a non-emergency police number for real-time enforcement response. Substantial fines will be established, posted on signs, and enforced. The City and preserve managers foster a sense of community stewardship in the OSMP preserve system and "empower" the residents living near and using the open space to notify the City and law enforcement of any illegal activities including illegal dumping.

Issue 15 (Key Issue): Management of Recreational Uses

The primary purpose of the open spaces is to meet the biological requirements of the HCP. Activities within the preserves will be those that are shown to not have a negative impact on the covered species. The location, type, timing, and frequency of activities (passive or active) in the preserve can all be modified to reduce or remove impacts and stressors to sensitive species. The impact of recreational activities will be evaluated through adaptive management and adjusted according to the monitoring data.

Passive and active recreational use in the OSMP area will managed to accommodate the diversity of compatible recreational uses but must also be consistent with the protection and enhancement of biological resources. Passive recreation includes activities such as walking, jogging, hiking, and bird watching. Active recreation includes activities such as mountain biking, equestrian use, and picnicking (picnicking is

considered an active use due to the prolonged and repetitive impacts on focused areas (typically grasslands and meadows) used for picnicking). Existing recreational facilities will be managed to promote the maintenance of habitat value surrounding these facilities. Passive recreation will be encouraged within the preserve areas but must be managed and directed away from the sensitive resources. Additional future active recreation projects will be accommodated outside the preserve on land not required to meet covered species habitat needs.

The preserve management plans that will be developed/updated for each preserve area will include a recreation plan component the addresses recreational issues and allowable use areas. The City and preserve managers need to establish consistent rules for recreational use so that members of the public can be knowledgeable without being confused by rules that change depending on the preserve management entity. The MHCP includes the following guidelines for the recreation component of the preserve management plan:

- Determine appropriate levels of passive and selected active recreational activities within the preserve, depending on the resources to be protected, season, and successional stage of the vegetation.

- Prohibit recreational activities that require construction of new facilities or roads.

- Develop design standards for new trail construction that address the avoidance of sensitive species, unique habitats, wildlife corridors, erosion control, and access to major features.

- Establish a recreational area patrol to regulate use of the OSMP area.

Specific Recreational Activities

- Passive Uses

    a. Limit or restrict passive uses in critical wildlife areas during the breeding season, as determined appropriate.

    b. Minimize adverse effects of passive recreation, such as trampling vegetation and erosion.

    c. Provide litter control measures, such as closed garbage cans and recycling bins, at access points in the OSMP area.

- Day Use

    a. Site picnic areas at the edges of the preserve.

    b. Collect garbage frequently and instruct day users not to feed wildlife.

- Equestrian Use

Trails may vary in width and surface material, depending on site-specific factors. Bicycles will generally be allowed on all trails except where specifically prohibited. Equestrian use of trails is generally prohibited, although there may be some future trails that will be designed for equestrian use. If and when the City determines that equestrian uses are allowed within the preserve, the following guidelines will apply:

    a. Prohibit horses in riparian areas. Construct trails away from riparian or other sensitive habitat. Provide alternative sources of water, where possible.

b. Mulch trail surfaces to minimize erosion. Do not use materials for trail mulch that are a source of seed of invasive exotic species. Prohibit use of eucalyptus chips that could suppress native plant growth adjacent to trails.

c. Limit equestrian use to specified trails that are wider than foot trails (minimum 8 feet wide) to prevent trail edge disturbance and on grades no greater than 25%. If trails become degraded due to heavy use, rotate or limit use during certain seasons to minimize further degradation.

d. Prohibit corrals, arenas, stables, and other associated equestrian facilities within the preserve. Locate staging areas for trailheads adjacent to existing roads and away from sensitive resource areas.

- Mountain Biking

a. Limit mountain bike trails to areas not highly susceptible to erosion and out of wetlands and other sensitive areas.

b. Construct trails wider than foot trails (minimum 6 feet wide) to prevent trail edge disturbance and on grades no greater than 25%.

c. Rotate bike use by closing trails periodically to prevent trail degradation if a problem develops.

d. Construct barriers to restrict access to sensitive areas.

Public Access

- Ensure that public access to OSMP areas included in the HMP/MHCP is consistent with the protection and enhancement of biological resources. Monitor existing access areas to ensure that they do not degrade or inhibit biological values, and prioritize future access areas for protection of biological resources.

a. Seasonally restrict access to certain trails if deemed necessary to prevent disturbance of breeding activities.

b. Close unnecessary trails to minimize biological impacts. Abandon and revegetate steep eroding trails.

c. Locate new trails away from sensitive resources or restrict their use so that covered species are not adversely affected.

d. Construct trails to any prominent features or viewpoints that are likely to attract hikers, thereby preventing extensive trampling and compaction.

e. Install water breaks on steep trails to prevent accelerated runoff and erosion.

f. Establish patrols to identify trail maintenance needs, garbage, vandalism, and habitat degradation and to enforce land use restrictions.

The Carlsbad Citywide Trails Program was established to plan and develop the circulation element trails (trails intended to supplement roads, enabling pedestrians and bicyclists to travel around the city) and the City's plan for recreational trails throughout the OSMP. Eventually, there will be up to 68 miles of recreational trails throughout the City. The City and existing preserve managers will develop and maintain approximately 25 miles of trails, while developers will build the other 43 miles as a part of the open space easements associated with new development. The City's trails team is in the process of working with developers and homeowner's associations to get new trails built as development occurs. It will be

important for the City's trails team to coordinate with preserve managers and other City staff to ensure that the MHCP guidelines for recreational uses are adhered to when new trail alignments are identified and developed. The placement and use of trails will be planned, monitored and managed so that that the trails don't not adversely affect sensitive species. Trail placement and use will be consistent with other management activities in the preserves and will be evaluated with adaptive management.

> **Conclusion/Recommendation 15:** The City and preserve managers will incorporate the MHCP guidelines for recreational uses into each preserve management plan. The MHCP guidelines will be used to establish a consistent set of rules for the OSMP citywide, to avoid confusion for members of the public. The City trails team and preserve managers will review the compatibility of the Carlsbad Citywide Trails Program and update or realign trails as needed in the plan to meet the biological protection goals and guidelines of the HMP/MHCP.

Issue 16 (Key Issue): Enforcement

Enforcement is a critical component of the OSMP and implementation of the HMP/MHCP. Enforcement programs are needed to ensure compliance with land use plans and restrictions, such as zoning, and to ensure that fire management and recreational uses are compatible with preserve goals. Enforcement has been an underlying part of the solution for many of the other issues discussed in this report (e.g., illegal off-road vehicles, illegal dumping, encroachment and some edge effects).

Enforcement of the City's laws and preserve and open space regulations falls into two categories of offences. First are the minor infractions, such as hiking on a closed trail, walking a dog off a leash, and over-watering the adjacent landscape. Minor infractions can be handled by the preserve manager through discussion and education of the offending party. The City and preserve managers will work together and with local community groups on a public education program to explain goals and regulations as well as educate the public on the area's resources. The City needs to work with existing preserve managers to address the issue of effective enforcement and deterrent methods.

Major infractions include illegal off-road vehicle use, illegal dumping, vandalism, and illegal encampments (itinerant workers and transients). Involvement of law enforcement officials will be necessary to address most all major infractions. Often the perpetrators of major infractions are not caught due to the delay in response time. However, more coordination and delineation of jurisdiction and enforcement authority may improve the frequency with which these perpetrators are caught and punished (creating a real deterrent for future infractions). The City, preserve managers, and police department will establish a coordinated response plan to address these issues.

The OSMP funding analysis (Appendix A of this document) identifies the need for one full-time supervising ranger/officer and four full-time rangers/officers with law enforcement training to effectively enforce applicable laws and safety in the OSMP area (as per conversations with and recommendations by Lt. Mike Ference, CDFG, and Supervising officer Dave Felt of the City of Carlsbad). The Rangers will coordinate with law enforcement agencies, including the City of Carlsbad's Police Department, Department of Fish and Game Wardens, and city police and parks officers. All staff vehicles will be equipped with radios and/or cellular telephones to report trespass and vandalism to security personnel or the Police Department. In addition to contributing to the species and habitat conservation goals of the HMP/MHCP, a strong security presence also enhances the experience of the public who are legally using the OSMP area and enhances the quality of life for residents of neighboring properties. The City of Carlsbad will work cooperatively with adjacent jurisdictions to establish and enforce consistent rules and regulations, and to cooperatively identify problem enforcement issues or repeat violators.

The ultimate level of enforcement of OSMP compliance with the HMP/MHCP lies in the implementing agreement with the wildlife agencies, because degradation of resources could result in loss or revocation of federal and state take authorizations. The City will maintain compliance with the HMP/MHCP permit conditions and the associated implementing agreement through the implementation of the OSMP and the actions of the City and other designated preserve managers. The annual reporting process will provide the wildlife agencies with the necessary management and monitoring data and preserve management status and

tracking data to evaluate compliance and/or the need for additional consultation and enforcement. In addition, the City and preserve managers will contact the wildlife agencies to resolve particular species and habitat issues on an as needed basis (e.g., to develop consensus on adaptive management strategies, to revise field survey protocols, to address a problematic invasive species problem, etc.).

> **Conclusion/Recommendation 16:** The City and preserve managers will pool their funding resources to hire five officer/rangers who will assist in preserve enforcement throughout the OSMP area. The City, preserve managers, and police department will establish a coordinated response plan to address these issues, and will work together and with local community groups on a public education program to explain goals and regulations as well as educate the public on the area's resources. The City needs to work with existing preserve managers to address the issue of effective enforcement and deterrent methods. The City will increase the frequency of ranger patrols at preserves to increase public compliance with leash laws, trespassing, and other illegal activities.

Issue 17 (Key Issue): Itinerant Worker and Transient Camps.

Itinerant (agricultural) workers and transients sometimes maintain shelters and living areas illegally within habitat areas. Such living areas have a detrimental effect on native vegetation and wildlife use, including an increase in refuse, poaching of wildlife, increased fires, and raw sewage disposal that can pollute water resources. These camps often become an eyesore and reduce the aesthetic value of open space, and create a significant safety risk for preserve managers and others using hiking and biking trails. The volume of refuse generated attracts black rats, which contribute to the decline of native rodent populations. Although scattered living areas will be difficult to control, villages of transients are incompatible with the biological, open space, and recreational goals for the OSMP area and will be removed.

The major location that homeless transients set up illegal encampments is in the riparian and scrub habitat along the Buena Vista Creek near Haymar Drive and the Plaza Camino Real and Vons shopping centers (Sgt. J. Chapman, pers. com.). While not as numerous as the agricultural worker camps, the homeless transient camps cause considerable habitat damage due to the volume of material that these people bring into the natural habitat areas. The itinerant worker camps are established in a number of locations, generally near the agriculture areas in which they work, with one of the largest encampments occurring on the canyon slopes south of Agua Hedionda lagoon.

While the impacts to the habitat are significant and incompatible with open space goals, the social, economic and ethical issues regarding how best to solve this problem are complex. According to an article in the North County Times (2/5/02) the itinerant farm worker makes up the majority of the more than 700 homeless that live in Carlsbad. Carlsbad police estimated in this article that only about 20 individuals are homeless transients, leaving 97% of Carlsbad's homeless identified in as itinerant workers. The City has removed camps and their residents in the past; however, these actions are likely to result in even more damage to the open space because most of those who are evicted have no other alternative and eventually end up establishing a new camp elsewhere.

Illegal camps are established in the canyons throughout the City because those living there see no other alternative. The high cost of housing and the limited availability of beds in shelters (50 beds and room for only about 25 additional temporary cots according the 2/5/02 NC Times article) leave these low-paid workers with little option. Therefore, alternative housing options must be established before additional camps can be removed. Currently, La Posada de Guadalupe, a 50-bed men's homeless shelter intended for immigrant workers and run by the Catholic Charities in Carlsbad, is the only shelter directly addressing this issue. The City continues to provide significant financial support to this shelter; however, the need for shelter still far outweighs the supply, resulting in continued impacts to habitat and open space value.

The City has been working on developing solutions for this issue with the police department, the shelter operator, and the County's Regional Task Force on the Homeless, a partnership of agencies and public groups. Due to the complexities involved, it is unlikely that the problem of illegal encampments will be

permanently solved with long-term solutions in the near future. However, the City will work to implement short-term measures to minimize the further degradation of open space.

Because confrontation of residents of illegal encampments may involve a number of complex issues ranging from health and safety to legal and civil rights, preserve managers should not attempt to confront individuals alone. Instead, preserve managers and other members of the public will contact the City regarding the location of an illegal encampment and coordinate any action or response through the City, police, and other qualified entities.

> **Conclusion/Recommendation 17:** The City will continue to work with local and regional agencies to find long-term solutions for housing of low-income itinerant workers and transients. The City will also work quickly to implement short-term solutions so that further habitat degradation is ceased. Note that a continued decline in habitat quality without active intervention from the City could result in the loss of one or more endangered species permits. The City will coordinate with all preserve managers to establish a protocol for reporting and handling illegal encampments to protect the health, safety, and legal rights of everyone involved. Preserve managers and rangers will notify the police department and the City when illegal encampments are discovered and will work with the City to remove structures and debris and revegetate the disturbed areas as necessary.

3.1.8 Biological Monitoring Responsibilities and Adaptive Management

Carlsbad must implement actions to ensure that conservation goals are met in the HMP portions of the OSMP area. The HMP/MHCP has established specific conservation goals and strategies to ensure the persistence or expansion of covered species, including key landscape or habitat attributes or ecosystem processes deemed necessary for long-term regional persistence (MHCP Volume II). Implementing actions to achieve the conservation goals or strategies by the City of Carlsbad is the basis for issuance of take authorizations under the HMP and MHCP plans. These implementing actions include monitoring and management of the preserve. The MHCP biological monitoring and management program has been structured to allow the wildlife agencies and the City (as a take authorization holder) to (1) evaluate compliance with HMP/MHCP conservation requirements (i.e., "compliance" or "implementation" monitoring) and (2) assess covered species population trends and additional key factors associated with species-specific conservation goals and strategies (i.e., "effects and effectiveness" monitoring) within the subregion and individual subareas.

Issue 18 (Key Issue): Coordination of Monitoring and Management Responsibility

The NCCP process and conservation guidelines require regular monitoring of covered species populations and their habitats. These surveys will supplement existing project-specific monitoring activities, such as that conducted by CDFG at Batiquitos Lagoon. The portions of the OSMP area included in the HMP/MHCP preserve must be monitored to assess the status and trends of resources within the preserve. Biological monitoring will evaluate whether the preserve system is meeting HMP/MHCP conservation targets for covered plant and animal species and their habitats, address specific questions regarding species population status and ecosystem functions, identify threats to covered species and their habitats, and help identify management needs. Monitoring will also identify issues requiring focused research to meet species-specific conservation goals and permitting conditions. The MHCP Biological Monitoring and Management Plan (MHCP Volume III) outlines the issues to be addressed by the long-term monitoring program. In addition, individual preserve management plans that include area-specific management directives will be prepared by preserve managers for individual preserve areas and will fully address preserve-level monitoring and management. It will be critical that monitoring and management is coordinated across the preserve system (across the OSMP area and the MHCP preserve network) for monitoring data to be collected and interpreted in a meaningful and useful way. As the permit holder under the HMP/MHCP, the City of Carlsbad has the responsibility to ensure that preserve managers coordinate among themselves (e.g., within a management unit), with monitoring and management in adjacent MHCP subareas, and with the wildlife agencies to efficiently monitor and manage species and habitats.

The introductory chapter of the OSMP addresses the process and structure by which the biological monitoring and management responsibilities will be distributed and coordinated among the City, preserve managers, and the wildlife agencies. The City will establish the role for a Preserve Steward, a City-contracted consultant or employee to oversee the City-wide monitoring, management, and maintenance of the preserve system. The preserve steward will be responsible for frequent communication with preserve managers, the City, and wildlife agencies, will provide science-based technical support to Preserve Managers for survey design, data collection and analysis, and will support the City in compliance monitoring (review of predevelopment plans and post-construction review).

As part of the annual reporting process, each preserve manager will be required to submit a Work Plan to the Preserve Manager and wildlife agencies for the coming year that identifies, describes, and prioritizes proposed surveys and adaptive management activities to be conducted in response to specified monitoring schedules or management circumstances. These work plans will be adjusted as needed in response to Preserve Steward and wildlife agency comments. For more urgent situations that cannot wait for inclusion in the annual work plan, ad hoc meetings with the Preserve Steward and wildlife agencies will be called.

A biological monitoring report will also be prepared every 3 years by the wildlife agencies to present data on the habitats and species monitored. To support this effort, every 3 years the managers of each preserve area will submit a report (including an updated preserve management plan) to the wildlife agencies that summarizes management activities, describes management priorities for the next 3-year period, reports on restoration activities, and evaluates funding and the ability to meet resource management goals.

In addition, coordination with other cities will be critical to the success of the preserves. The MHCP calls for creation of a subregional structure for coordination between the North County Cities. For this reason, it is planned that this first OSMP, as a "first step" for the MHCP, will become a model and template for other cities and will be refined and adjusted based on experience and the evolving subregional implementation structure.

Note that where the City is mentioned throughout the OSMP with respect to preserve monitoring and management it is implied that that it is the City with the support of the Preserve Steward to provide science-based guidance and oversight to the OSMP implementation.

> **Conclusion/Recommendation 18:** The process and structure for coordination and implementation of the OSMP is defined in detail in the introductory chapter of the OSMP. The City of Carlsbad will be responsible for coordinating with other cities in the MHCP to implement monitoring and management across the MHCP preserve network. The City will create the role of a Preserve Steward to oversee and support the science-based implementation of the OSMP. The preserve steward along with the USFWS and CDFG will provide oversight, including review of surveys, preserve management projects, and approval of results and reports generated by the monitoring program. The City of Carlsbad and its preserve steward and preserve managers are responsible for preserve level monitoring and management for the OSMP area, preparation of the preserve area plans specifying the monitoring and management activities for a given preserve area, and preparation of annual reports to the wildlife agencies summarizing monitoring and management actions and results.

Issue 19: Trigger for Adaptive Management

The City, the preserve steward, and preserve managers in the OSMP area are responsible for managing individual preserve areas to ensure that conservation goals of the HMP/MHCP are met. Monitoring at the preserve area scale needs to be focused on obtaining information for management purposes. Managers must monitor the status and trends of covered species and collect data on key environmental resources within preserve areas to select, prioritize, and measure the effectiveness of management activities. In most instances, the array of threats or stressors of preserved habitats, their mechanisms of action, and the responses of the habitats and associated species are not completely understood at this time. Therefore, individual preserve management plans must comprehensively address management and monitoring issues

for each preserve area. Information collected within the preserve areas will be aggregated for analysis at the MHCP subregion and ecoregion scales.

Information gained through monitoring will inform management decisions through the adaptive management process. Adaptive management acknowledges the lack of complete knowledge and understanding of a system at the outset of management actions. Adaptive management is a means to learn more about the system through the implementation of management actions and the monitoring of management results. Management actions can then be adapted to optimize management goals by incorporating new information gained through an iterative implementation and monitoring process. There are six main steps in adaptive management: (1) identification of the problem or management goal; (2) design of the management action or implementation plan; (3) implementation; (4) monitoring of management results; (5) evaluation of the results relative to the desired management goals; and (6) adjustment of management actions. The trigger for a change in the management approach/actions occurs when management results have not achieved the desired management goals. The assumptions underlying management goals must be stated explicitly and considered as hypotheses to be tested by carefully designed and implemented monitoring programs that are, in effect, management experiments. Ideally, management actions would be designed and implemented with experimental control sites and replication that would allow statistical interpretation of management results. This may be possible for some management actions in some preserve areas, but not a realistic expectation for all management actions across the whole OSMP area. At a minimum, careful measurement of key environmental and biological variables before and after the management action can provide some insight into the effects of management at that particular site.

For the OSMP area, an adaptive management approach will provide correcting actions where monitoring shows that (1) resources are threatened by land uses in and adjacent to the preserve, (2) current management activities are not adequate or effective, or (3) enforcement difficulties are identified. The preserve steward will work with preserve managers to identify specific adaptive management triggers for key management issues and target species to be addressed in the preserve management plans and area-specific management directives.

> **Conclusion/Recommendation 19:** The City of Carlsbad, the preserve steward and other preserve managers in the OSMP area will apply an adaptive management approach to all management activities. Corrective actions within an adaptive management context will be undertaken as soon as possible to prevent further degradation and more costly remedies later. If management targets (e.g., habitat condition, invasive species eradication, etc.) are rapidly deviating from desired goals, the preserve manager and/or City will contact the wildlife agencies and other issue experts to seek the best available advice as soon as possible.

Issue 20 (Key Issue): Data Management

Data collected for preserve-level monitoring and management will, in most cases, be linked to a GIS database to facilitate adaptive management decisions and monitoring analysis. It will be important for some data types (i.e., species and habitat monitoring) to be collected using methods standardized across the MHCP subregion such that subregional trends in species populations and vegetation communities can be analyzed. Furthermore, data will be systematically collected to facilitate the City's annual reporting requirements. The MHCP Monitoring Plan (MHCP Volume III) includes many sample datasheets, species monitoring guidelines, and recommended vegetation mapping methods. Preserve managers will be required to use these standardized methods and data formats to facilitate integration and management of the data.

GIS data will be managed and maintained by City staff with a GIS technical background to ensure that the data are input and managed properly according to accepted GIS data standards (e.g., maintenance of metadata, updates, backups, and overall database structure). The City will investigate ways in which the OSMP GIS database can be efficiently linked to the data collected by preserve managers. If data and management results are frequently updated into the OSMP GIS database, the City's annual reporting and the wildlife agency subregional status and trends analyses will be made much easier. The OSMP GIS database could be linked to the Internet through an OSMP webpage enabling 1) the preserve managers to

"upload" their data and monitoring results, 2) the City to coordinate monitoring and management among preserve areas, and 3) the City to provide data and information to interested members of the public regarding OSMP monitoring and management activities.

> **Conclusion/Recommendation 20:** The City will require that preserve managers within the OSMP area adhere to all the MHCP established monitoring methods and use the standardized data collection formats. The City will investigate the development of a GIS database management tool that is accessible through the Internet and, if developed, will use this tool to efficiently maintain current data, coordinate management and monitoring, and provide information to the public.

Issue 21 (Key Issue): Coordination of Lagoon Management

There are numerous ongoing lagoon management activities occurring in all three of Carlsbad's lagoons (Batiquitos, Agua Hedionda, and Buena Vista Lagoons) including management of sediment transport and hydrology, species monitoring, exotic species control, and recreation. Although CDFG is the primary management entity of the majority of the lagoon habitat (essentially all of Buena Vista and Batiquitos and the eastern portion of Agua Hedionda; see Figure 2-3), it is still important for the OSMP to provide coordination and guidance for the secondary management entities (e.g., Buena Vista Lagoon Foundation) and other important lagoon managers (i.e., SDG&E/Cabrillo Power).

Dredging has become an important management tool at all three lagoons, either to remove accumulated sediment in the basin or to open the tidal channel to improve tidal flushing and water quality. Dredging has also been used to create beach/dune habitat for nesting birds including snowy plovers and least terns. Sedimentation within Buena Vista, Batiquitos, and Agua Hedionda lagoons accumulate sediment from their tributary creeks and from long-shore sand movement at the mouths of the lagoon. Future planning and implementation of dredging activities will be coordinated through the OSMP so that dredging objectives are met without interfering with other biological management responsibilities under the HMP/MCHP. Of particular importance in this respect is the desired future condition of Buena Vista Lagoon. If undertaken, dredging to restore tidal influence will have a major effect on the habitat and species composition as portions of the existing freshwater marsh system convert back to brackish or saltwater marsh.

Species monitoring and management at the lagoons will continue to be the primary responsibility of CDFG in areas where it is the primary management entity. The Ecological Reserve Management Plans for each of these three lagoons will include area-specific management directives and species monitoring protocols that are consistent with the requirements of the HMP/MHCP.

Generally, exotic species monitoring and control is an expected component of every preserve manager's preserve management plan (e.g., Arundo control at Buena Vista Lagoon). Infrequently, however, an invasive species is introduced into an area and spreads (or has the potential to spread) so rapidly and destructively that the control and eradication of the species must be addressed with the highest urgency and priority. When *Caulerpa taxifolia*, a highly invasive and destructive seaweed, was found in Agua Hedionda lagoon, it was clear that immediate state and federal action was needed to address the problem.

Caulerpa has become a devastating invasive species in the Mediterranean Sea. Around 1984 this species apparently escaped or was released from an aquarium into Mediterranean waters. By 1997 it was reported to have blanketed more than 11,000 acres of the northern Mediterranean coastline and has recently been reported off northern Africa. In areas where the species has become well established, it has caused ecological and economic devastation by overgrowing and eliminating native seaweeds, seagrasses, reefs, and other communities. In the Mediterranean, it is reported to have harmed tourism and pleasure boating, devastated recreational diving, and had a costly impact on commercial fishing both by altering the distribution of fish as well as creating a considerable impediment to net fisheries.

Eradication efforts in southern California (Agua Hedionda Lagoon and Huntington Harbor, where it was also found) are currently underway under the direction of the Southern California Caulerpa Action Team, a broad-based task force assembled from federal and state resource and regulatory agencies and the City, exotic species experts and marine resource scientists. These scientists and managers are cautious, but

hopeful that complete eradication can be achieved with ongoing monitoring and treatment. Under State law (Assembly Bill 1334), the sale, possession, and transport of *Caulerpa taxifolia* was prohibited throughout California in September 2001.

Issues regarding dry land recreation activities at the lagoons are addressed under several other issues above (e.g., public access, trials, off road vehicles, and management of recreational uses). Aquatic recreation is prohibited in Batiquitos and Buena Vista Lagoons, but is allowed on the inner lagoon of Agua Hedionda. A youth camp, private marina and public boat launch on Agua Hedionda provide canoeing/kayaking and motorized water sports actives. Active aquatic recreation including kayaking is not allowed on Batiquitos or Buena Vista Lagoons, but is a frequent illegal activity according to Seth Schulberg of the Batiquitos Lagoon Foundation (N.C. Times, 3/16/01). The City and CDFG will investigate the need for additional signage regarding areas where aquatic recreation is prohibited, since it appears that the majority of violations are innocent misunderstandings (N.C. Times, 3/16/01).

The following assumptions were critical to the justification for conservation of lagoon species in the MHCP; and therefore need to be adopted and carried forward by the OSMP to maintain compliance with the HMP/MHCP:

- Maintain connections between coastal lagoons and inland habitats, primarily for coyote movement, as a specific element of the MHCP preserve design. It is assumed that this will allow top predators to control mesopredators in the lagoons systems, and nest predation on ground-nesting birds will be reduced.

- Maintain adequate buffer areas around salt marsh and mudflat habitats to minimize disturbances and edge effects and to help maintain water quality. Conserve and manage wetland habitats upstream from coastal wetlands to help maintain water quality.

- Manage newly created dredge spoil islands for the western snowy plover and least tern to provide cover materials, suppress weed growth, and control predation and human activity. Minimize human disturbance to increase the likelihood of elegant tern recolonization and breeding.

There are several lagoon-specific management actions recommended by the MHCP monitoring plan (MHCP Volume III) to address the issues identified above and to minimize potentially negative impacts, including:

- Establish boardwalks to protect habitat from trampling.
- Create or enhance protected beach areas, tidal creeks, or islands to provide breeding areas for covered bird species.
- Restore saltmarsh habitat and adjacent uplands.
- Provide shoreline stabilization to control erosion.
- Remove trash, including water-borne debris in breeding areas, during the non-breeding season.
- Dredge the mouth of the lagoon to keep it open.

Conclusion/Recommendation 21: The City will work with the various lagoon management entities to coordinate dredging activities to meet the goals of hydrology/sediment management and biological conservation. The OSMP will be used as a tool to facilitate this coordination. CDFG will maintain the responsibility for species and habitat monitoring and management and the Southern California Caulerpa Action Team will continue to lead Caulerpa eradication efforts. The City will assist in monitoring and enforcement of the state ban on sale, transport, and possession of Caulerpa through periodic monitoring and informational outreach to pet stores and through educational outreach to the general public. The City will work with CDFG to improve enforcement of boating regulations on the lagoon areas where it is prohibited.

Issue 22: Restoration

Restoration is the process of reestablishing or enhancing historic biological functions and values to degraded habitats. Restoration methods range from active revegetation to passive management. Generally, labor-intensive restoration methods involving active revegetation take less time to achieve biological goals but at greater cost than more passive management techniques, such as fencing to limit further disturbance.

Active revegetation and restoration projects rely on techniques that encourage natural regeneration or use intensive horticultural methods such as planting, seeding, transplanting, and salvaging. The source of seeds and plants used for such projects has tremendous genetic implications. Non-local planting stock can introduce novel, undesirable, or maladapted genotypes into the ecosystem. Use of non-local stock may also result in mortality or problems with growth and reproduction. Thus, active restoration programs will use propagules from sources close to the restoration site. Planting stock must also be inspected for invasive pests, such as Argentine and fire ants, and any infested stock must be removed from the vicinity of the OSMP area and properly treated or disposed.

In most OSMP areas there are ample opportunities for restoration and/or habitat enhancement. Therefore, restoration will be an important component of the area-specific management directives and goals of each preserve areas preserve management plan. For many preserve areas restoration may be prescribed on an as-needed basis to revegetated non-permanent trails and disturbed areas to enhance habitat quality and reduce the extent of nonnative seed sources within the OSMP area. There will be a larger and more focused restoration component for other preserve areas within the OSMP. A restoration component is often a part of the development and mitigation agreements that have established the preserve areas. For the four existing preserve management plans, Habitat Management Plan for the La Costa Preserve (CNLM), Habitat Management Plan for the Kelley Ranch Habitat Conservation Area (CNLM), Perpetual Land Management Plan for Calavera Nature Preserve (TET), and Calavera Hills Phase II Final Habitat Management Plan (TET), only the Calavera Hills Phase II has a focused restoration component (Area K abandoned easement restoration). A focused restoration plan was prepared to implement the Area K restoration project. The remaining areas of these four preserve management plans will be restored/enhanced on an as-needed basis.

The Batiquitos Lagoon Enhancement Project has been implemented and is in the restoration monitoring phase of the project. It is assumed that ongoing monitoring and management of this project will be addressed by the Batiquitos Lagoon Ecological Reserve Management Plan once it is completed.

There is a requirement under the HMP/MHCP for an additional 104 acres of coastal sage scrub to be restored within the City of Carlsbad to contribute to the recovery and conservation of the California gnatcatcher and other scrub habitat species. The HMP identifies six Local Facilities Management Zones (Zones 5, 8, 14, 15, 17, and 18) as areas where coastal sage scrub restoration is recommended. The City and preserve managers will need to incorporate coastal sage scrub restoration plans into the preserve management plans for these areas. The restoration of 104 acres will be funded though the regional funding source; therefore, it will not begin until after the regional funding mechanism is established.

Detailed restoration management plans will be prepared, as part of area-specific management directives, according to the MHCP guidelines for restoration within the MHCP preserve area (MHCP Volume III).

> **Conclusion/Recommendation 22:** The City and preserve managers will need to incorporate restoration and enhancement into the individual preserve management plans. Additionally, detailed restoration management plans will need to be prepared for individual restoration projects for restoration required by project-specific mitigation, for the 104 acres of coastal sage scrub restoration through the OSMP area, and for additional restoration needs identified by preserve managers. Restoration management plans will be consistent with the guidelines provided in MHCP Volume III. The restoration of these 104 acres will occur once a regional funding source is available.

Issue 23: Erosion Control

Erosion is promoted by the combination of erodible soils, steep slopes, soils with low water-holding capacity, sparse to no vegetation, and hydrologic condition of the soils. Erosion can be aggravated by human disturbance and fire-control activities. Erosion hazards to biological resources include pollution and sedimentation of important water sources and the loss of vegetative cover from landslides.

Management and repair of erosion problem areas will generally be handled by individual preserve managers on a case-by-case basis. Preserve managers will develop and implement an erosion control plan for high priority erosion control areas as part of area-specific management directives in individual preserve management plans. In general, this will include establishing physical features to slow surface flow and dampen initial precipitation impact, and revegetation of eroded surfaces for long-term protection. In steep areas, rock areas, and areas of high storm flow, permanent rock or concrete revetments may be required to stabilize undesirable erosive forces. In most cases preserve managers will be able to control and/or eliminate erosion problems; however, severe erosion problems may occasionally occur (e.g., with a major storm event and/or slumping and slope failure). In these rare cases the City will need to coordinate emergency measures possibly with the assistance of other agencies (i.e., ACOE and USFWS) to repair major erosion damage.

The following guidelines are provided in the MHCP (Volume III) for erosion control within preserve areas.

Identify and Prioritize Areas for Erosion Control

- Identify areas of moderate to severe erosion within and adjacent to the preserve.
- Determine causes of erosion and current or potential adverse or beneficial effects on habitat within the preserve.
- Rank identified erosion areas according to threats to biological resources. Include an assessment of cost for erosion control measures.

Address Slope Stabilization and Surface Drainage

- Prepare contingency native seeding plans for highly erosive areas temporarily disturbed by fire.
- Prohibit bare surface grading for fire control on slopes. Ensure that all techniques implemented for fire control leave (or replace) adequate vegetation cover to prevent surface erosion.
- Ensure that all areas identified for revegetation are adequately stabilized by either a binder or straw cover after planting to minimize surface erosion.
- Ensure that no new surface drainage is directed into the preserve.

Conclusion/Recommendation 23: The City and preserve managers will need to incorporate erosion control plans into the individual preserve management plans. The City will assist in coordination and repair of severe erosion problems. Erosion control and management plans will be consistent with the guidelines provided in MHCP Volume III.

Issue 24 (Key Issue): Public Information, Education, and Beneficial Use of Open Space

Public support is essential for the successful long-term funding and management of the OSMP preserve system. City residents derive many beneficial uses of the open space that will be protected within the OSMP area, including trail use for hiking, biking, and bird watching or simply the enjoyment of the scenic beauty preserved in vistas from roadways and backyards. Public education is a critical issue for preserve management because a well-informed public is a good steward and partner in preserve protection.

Currently, the primary mechanisms for public information and education are handled voluntarily by the local environmental interest groups and secondary management entities (e.g., Preserve Calavera, Batiquitos Lagoon Conservancy, and Buena Vista Lagoon Conservancy). These groups provide information and education to the public about habitat protection and recreation (including recreation restrictions) as well as provide information to the City and wildlife agencies regarding open space management issues and violations (e.g., illegal off road vehicle use). These groups are each only focused on a specific portion of the OSMP and do not comprehensively address all of the public education and information needs (due to funding limitations and/or mission of organization). Additionally, signage and informational/educational kiosks provide supplemental sources of public information and are maintained at a number of the actively managed preserve areas.

The City of Carlsbad has a series of "Let's Talk About..." flyers that address some of the important open space issues such as parks, trails, and open space. These flyers are available at the City offices and through the City website and provide a very good overview of some of the basic open space issues.

Most of the OSMP issues addressed in this report have an important public education/information component to the solution. Therefore, there is a substantial need for a comprehensive public education and information program to be established Citywide. This program will be managed and implemented by the City in coordination with the other preserve managers and the other environmental organizations, conservancies, and interest groups. This program will include, but not be limited to, the following tools to improve public knowledge, involvement, and cooperation with open space conservation:

- Expand the "Let's Talk About..." series to include every issue addressed in this report that requires public outreach and education in the solutions (e.g., domestic pets in preserves, landscaping and irrigation, off road vehicle use, etc.).
- Public service announcements and public access/local television programs featuring open space issues in Carlsbad.
- Distribution of public outreach materials through HOAs, shopping centers, and service groups
- Establish an OSMP website with information on open space issues, management of each preserve area, links to GIS data in the OSMP Inventory, species and habitat information, and recreational information.
- A Carlsbad Open Space Schools program to educate school children about the open space in their neighborhoods and the species and habitats that are their "neighbors".
- Signage and educational kiosks to inform those using the trail systems;
- Public outreach to encourage "best management practices" of residences living near preserves to control edge effects such as beneficial landscape practices and domestic pets allowed to roam in the preserves; and
- Volunteerism and involvement of school and community groups to foster a sense of stewardship in the preserves.
- Establish a "hotline" for members of the public to report violations in the preserve and other preserve-specific problems.

Conclusion/Recommendation 24: The City will develop a citywide public information and education program to comprehensively address the public education and information needs as described above. Local public outreach to the immediate neighbors or other public users of the preserve will be conducted by each preserve manager as needed. The preserve manager will solicit assistance from the City-wide program as necessary and vise versa.

Issue 25: Fencing and Signs

Fencing plays an important role in the use of the landscape by humans, domestic animals, and wildlife. Fencing can restrict grazing and control human access, particularly off-highway vehicles. Fencing can direct wildlife to road undercrossings and prevent road kills. However, fencing also can restrict normal wildlife movement, restrict access to food and water, and force wildlife onto roads.

The City and preserve managers will install and maintain fencing where it is needed to protect resources, but will remove existing fencing where it occurs within the OSMP area and has no obvious need or function.

Fencing will be used to funnel wildlife away from at-grade road crossings and toward undercrossings; fencing at wildlife undercrossings will be 6 feet high (10 feet high if mule deer and/or mountain lion have been identified in the area), use a mesh with openings no greater than 4 inches square, and will ideally be buried at least 12 inches below ground to prevent wildlife crawling or digging beneath the fence and to minimize management costs (e.g., due to erosion beneath the fence). To protect particularly sensitive species or habitats, the City and preserve managers will use perimeter fencing or between public access areas (e.g., trails) and sensitive resources (e.g., vernal pools).

For fencing designed to keep wildlife off roads, some design standards will be included for allowing escape routes in the event that large animals are trapped by the fence within the roadway corridor. Successful designs have included occasional dirt ramps or one-way gates.

Preserve managers will limit human access to designated trails using natural vegetation, topography, signs, and limited fencing, and will design and locate fences within the preserve so they do not impede wildlife movement.

Signs educate, provide direction, and promote the sensitive use and enjoyment of the OSMP area, but they can also inadvertently invite vandalism and other destructive behavior. Signs that explain the rules and restrictions of a preserve area are most effective at public entrance points. Signs for educational nature trails and on roads near wildlife corridors (to reduce road kills) also will be posted at appropriate locations.

The City and preserve managers will establish signs for access control and education at the periphery of the preserves that are open to human access. Signs will be posted to prohibit firearms and unleashed pets and for educational nature trails.

Signs will be limited at sensitive species locations so as not to attract attention to sensitive species; signage may invite disturbance of their habitat. Temporary signs will be used to indicate habitat restoration or erosion control areas, and barriers and informational signs will be used to discourage shortcuts.

The City and preserve managers will also provide educational brochures, interpretive centers, and signs to educate the public about the resources and goals of the OSMP, HMP and MHCP. This effort will be coordinated through the recommended citywide public information and education program.

> **Conclusion/Recommendation 25:** Signage and fencing are the responsibility of the primary management entity for each preserve area. The City will work with each preserve manager to develop standardized signage and OSMP rules and regulations to avoid confusion. Signage and fencing will be installed and/or maintained as described above and in the MHCP (Volume III).

Issue 26: Preserve Assembly and Integration with Habitrak

It is assumed that the City will use *HabiTrak* for preparing annual reports of habitat development and preserve assembly for the wildlife agencies. The HMP/MHCP must be monitored over time to determine if the implementation measures are achieving the goals and objectives of the plan. Included in this monitoring is an accounting of the gains and losses of habitat as development proceeds and new open space is dedicated.

GIS accounting of the acreage, type, and location of habitat (vegetation communities) and covered species conserved and destroyed by permitted land uses and other activities, is required to be tabulated annually for the Carlsbad HMP area and every 3 years for the MHCP as a whole.

A committee of City of San Diego, County of San Diego, SANDAG, and wildlife agency staff has developed a GIS-based tool for this purpose (HabiTrak), which will be used for habitat accounting by the City of Carlsbad for the HMP. Carlsbad will be responsible for the annual accounting of the acreage, type, and location of vegetation communities and selected covered species conserved and destroyed by permitted land uses and other activities within its subarea. Habitat accounting will also be used to track conservation of vernal pools. Records will be maintained in ledger and digital map (GIS) format. This information will be submitted to the wildlife agencies as part of an annual public report to demonstrate compliance with the terms and conditions of the HMP, implementing agreement, and take authorization. Carlsbad will hold annual public workshops to brief interested citizens on the progress of preserve assembly.

The Habitrak system is GIS based, therefore, it will be relatively straightforward to apply the Habitrak system to the OSMP area if the City decides to develop the GIS database management tool for coordination of data and reports from all preserve managers.

> **Conclusion/Recommendation 26:** The City will coordinate with preserve managers to establish a schedule and deadlines for reporting of data and project status with preserves so that citywide data are available to the City with sufficient time to update the Habitrak accounting system and prepare the City's annual reports.

THIS PAGE INTENTIONALLY LEFT BLANK